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SUMMARY OF RECENT ABSTRACTS*

II. YELLOW FEVER

Epidemiology

DE AZEVEDO *et al.* (p. 1081) found yellow fever protective antibodies in the sera of the people of Portuguese Guinea, but as vaccination has been carried out in the area the significance of these protective bodies was usually doubtful, except in one area where vaccination had not been practised and in which one old person showed protective bodies.

LEVI CASTILLO (p. 703) has written an account of jungle yellow fever in South America during the period 1932–47, but this cannot be abstracted here.

Aetiology : Animal Hosts : Transmission

Because of the shortage of monkeys during the war STÉFANOPOULO and DUVOLON (p. 252) were led to investigate the effect of various strains of yellow fever virus on the guineapig. Virus 17D killed about 40 per cent. of guineapigs when inoculated intracerebrally, and the authors think that these animals may be useful in detecting potential neurotropism, but the rhesus monkey remains the most suitable animal for this purpose.

HOCKING (p. 72) estimates the prevalence of *Aëdes* by placing bamboo " pots " filled with water in the places investigated, and leaving them for 5 days. The number containing *Aëdes* larvae provides a good index of prevalence.

WADDELL and TAYLOR (p. 72) have devised a method for comparing the transmitting capacity of *Haemagogus equinus* with that of *Aëdes aegypti* under the same conditions. The ratio of transmission was constantly higher with *Aëdes aegypti* than with *H. equinus*. WADDELL and KUMM (p. 894) tested the capacity of *Haemagogus capricorni* to transmit yellow fever from infected marmosets, and found that its capacity to transmit by bite was not constant. In general a certain titre of virus in the blood was necessary for infection of the mosquitoes ; below this, even though virus was present, infection did not take place.

WADDELL and TAYLOR (p. 510) show that although under favourable laboratory conditions certain strains of jungle yellow fever virus may be maintained in marsupials and *Aëdes aegypti*, strain differences of the virus may be great enough to affect cyclical passage ; moreover, the infected marsupials did not infect mosquitoes which fed on them so well as marmosets. These

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1948, v. 45. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

results suggest that more evidence is required before the marsupials (*Metachirus nudicaudatus* and *Marmosa cinerea*) are incriminated as hosts of the virus in nature ; in one field enquiry no evidence was obtained that marsupials play a significant rôle in propagation of the virus.

CAUSEY *et al.* (p. 992) have investigated the distance from their homes to which certain Brazilian monkeys travel. Their normal movements are within a few hundred yards of the home forest, and do not explain the rapid and extensive spread of yellow fever through the sparsely wooded areas of Brazil. CAUSEY and KUMM (p. 1080) show that when marked forest mosquitoes were released in the forest in Brazil, most of those recaptured were taken near the point of release, but some were caught one kilometre away. In another experiment certain species of *Aëdes* were captured up to 4·7 kilometres from the point of release ; some of these were experimentally proved vectors of yellow fever.

LAEMMERT (p. 894) tested the susceptibility of various neotropical rodents to infection with yellow fever virus ; some were quite resistant, others showed circulating virus with some strains, or developed protective antibodies. Details should be sought in the original.

Investigating the susceptibility of certain species of bats to yellow fever virus, HUGHES and PERLOWAGORA (p. 510) could not recover virus from 254 bats infected, nor could they detect neutralizing antibodies after the infection.

Immunization : Control

In French West Africa immunization against yellow fever has been combined with vaccination against smallpox, both viruses being reconstituted from the dried state, pooled, and inoculated by scarification. It has been suggested that post-inoculation encephalitic accidents occur more frequently after the combined vaccination, and LÉPINE *et al.* (p. 329) have attempted to obtain information, by animal experiment, as to the possibility of increased virulence or neurotropism when the viruses are combined. The experiments showed no evidence of this, but, as MACCALLUM points out in comment, these results do not settle the problem, because the agent producing post-vaccinal encephalitis in man is not known.

Investigations by FOX *et al.* (p. 511) on the duration of immunity after vaccination with strain 17 D have given complete support for the 4-year certificate of immunity which is now in general use.

DE CAIRES (pp. 253, 511) describes in detail the extensive organization developed in Georgetown, British Guiana, for controlling *Aëdes aegypti* before the advent of DDT, and shows how greatly the use of this insecticide has reduced the cost of control and the staff formerly needed. By using it as a residual spray in buildings, *Aëdes aegypti* has apparently been eradicated in Georgetown. GIGLIOLI (p. 485) has also shown that the domestic biting and resting habits of *Aëdes aegypti* in British Guiana render the prospects of control by residual spray with DDT excellent.

NEGHME RODRÍGUEZ (p. 594) describes the measures taken in Chile, especially at Arica, to control *Aëdes aegypti*. These include the use of DDT, antilarval measures, inspection of traffic and disinsectization of aircraft, etc.

Charles Wilcocks

MALARIA

HUFF, C. G.; COULSTON, F.; COATNEY, G. R.; COOPER, W. C.; PORTER, R. J.; HAAS, V. H.; WILCOX, Aimee; LAIRD, R. L.; EWING, Frances M.; COLEMAN, Nell. **Symposium on Exoerythrocytic Forms of Malarial Parasites.** *J. Parasitology.* 1948, Aug., v. 34, No. 4, 261–320.

I. Introduction [HUFF] pp. 261–3.

Once it was known that certain species of *Plasmodium* had exo-erythrocytic stages in their life history, it was natural that active research in this field should be stimulated. This work received added impetus during World War II owing to the need for discovering prophylactic antimalarial drugs acting against exo-erythrocytic stages. It was to integrate the knowledge being acquired on various aspects in this field of research that a symposium was held on the subject.

Exo-erythrocytic stages are well known in certain species of *Plasmodium* parasitizing birds and, in one species, parasitizing lizards.

In the species *P. elongatum*, although cells of the erythrocytic series are preferred by the parasite, it can and does parasitize almost all cells of the blood and the blood-forming cells of the host. In the other species of avian *Plasmodium* which have been adequately studied, cells of the lymphoid-macrophage system are preferred although cells of other types may be parasitized. In *P. mexicanum* of lizards the potencies of both types described above are combined so that the parasite may invade any of the cells referred to.

In the species *P. gallinaceum*, *P. relictum*, *P. cathemerium* and *P. lophurae*, there are pre-erythrocytic stages of development in macrophages or related cells. The first stage developing from the sporozoite is called a cryptozoite and subsequent stages are called metacryptozoites.

If exo-erythrocytic stages exist in human and simian malaria parasites they are relatively fewer and less accessible than comparable stages in avian malaria. Some workers have claimed their discovery while others have searched intensively for them in vain. Indirect evidence of their existence is strong. Thus there may be long periods of aparasitaemia in the blood, followed by patent parasitaemia, and further evidence is afforded by the chemotherapy of the infections.

The discovery of exo-erythrocytic stages has given new lines of approach to chemotherapy by allowing study of the effects of drugs and of immune reactions upon the actual parasites, a procedure rendered easier by their large size. In addition, studies by the tissue culture method have been facilitated since some of the host's cells concerned are easier to grow and to keep alive than are erythrocytes. Other lines of study made possible are the changes produced by altering the species of host, or age of host; by transmitting infections serially from bird to bird through blood inoculation only; by serial transfer of infected brain material from chick to chick; and by similar transfer from chick embryo to chick embryo.

The author utters a warning on the limitations imposed on the contributors to the symposium. The latter gives an incomplete picture and does not answer all questions on exo-erythrocytic stages. It is further emphasized that results obtained with one or more species should not be considered necessarily applicable to all related species and that the findings in avian malaria may not have a parallel in human or simian malaria. The study of malaria parasites should be viewed as a whole and should be combined with consideration of the related genera *Leucocytozoon* and *Haemoproteus*, which are almost exclusively exo-erythrocytic in their development.

II. A Search for Pre-Erythrocytic Stages of *P. vivax* and of *P. cynomolgi* [HUFF & COULSTON]. pp. 264–74, 1 fig. [10 refs.]

There is strong indirect evidence for the existence of pre-erythrocytic development of malaria parasites of man and monkeys. While such development has been demonstrated in reptilian and avian malaria, there was [when the authors wrote] no conclusive evidence of its presence in mammalian malaria. This uncertainty led to the present investigations, from this point of view, of *P. vivax* of man and *P. cynomolgi* of the monkey. Although pre-erythrocytic development in these species was not demonstrated, an account is given of the materials and methods employed.

In the case of *P. vivax*, three strains were employed and in the case of *P. cynomolgi* one strain. For both species *Anopheles quadrimaculatus* was used as the insect host. Mosquitoes, infected on man or monkey carrying gametocytes, were dissected in a mixture of equal parts of distilled water and serum of the animal to be inoculated and the sporozoites in the glands supplied the material for inoculation. The experiments were divided into those in which *P. vivax* was inoculated into man and monkeys and those in which *P. cynomolgi* was inoculated into *Macaca mulatta*.

In the series of human experiments, the following tissues were inoculated with sporozoites from the glands of 6 to 150 infected mosquitoes in each case :—

Skin	on 24	occasions
Lymph nodes	,, 7	,,
Isolated veins	,, 4	,,
Bone marrow	,, 2	,,
Muscle	,, 1	,,

The examination of sections of the infiltrated areas for pre-erythrocytic forms was uniformly negative.

Further to verify the absence of pre-erythrocytic forms in the inoculated areas of skin or those subjected to bites of infected mosquitoes, the inoculated and bitten areas were excised and inserted subcutaneously into fresh individuals. None of these became infected although all the donors of skin became so.

Owing to the limitations imposed by human experimental material, attempts were next made to demonstrate pre-erythrocytic stages of *P. vivax* in monkeys. This attempt was based on the authors' demonstration that sporozoites of *P. gallinaceum* and *P. relictum* when inoculated into hosts in which no parasitaemia resulted, might yet produce pre-erythrocytic stages in these uncongenial hosts.

The monkeys used were *Macaca mulatta*, *Papio papio*, two subspecies of *Cercopithecus aethiops* and *Cercocebus fuliginosus*. The infective material was inoculated into skin, bone marrow, liver and spleen. Again, prolonged search for pre-erythrocytic forms yielded entirely negative results.

In a footnote the authors state that since submission of the paper the publication of the finding of pre-erythrocytic stages of *P. cynomolgi* and *P. vivax* by SHORTT and GARNHAM, and SHORTT, GARNHAM, COVELL & SHUTE [this *Bulletin*, 1948, v. 45, 388, 482], led them to a re-examination of their material with the finding of certain structures they presume to be cryptozoites of *P. vivax* in the liver of *Macaca mulatta*. The description of these must be awaited before comment can be made.

As a final experiment, the techniques already used in the case of *P. vivax* were applied to *P. cynomolgi* with *Macaca mulatta* as the host. In this case, internal organs as well as more superficial structures were subjected to inoculation of sporozoites. Biopsies made on the spleen, liver, bone-marrow and skin of six monkeys yielded negative results.

In the discussion, the authors emphasize the limitations imposed when working with human subjects, but reach the justifiable conclusion from their experiments that it is highly improbable that pre-erythrocytic stages of *P. vivax* develop in the skin or in cells of the reticulo-endothelial system, many of which are to be found in the inoculated areas.

The experiments with *P. cynomolgi* and *M. mulatta* were free from the limitations of the human experiments, but, owing to the small number of animals used, are not considered conclusive [see also this *Bulletin*, 1948, v. 45, 762].

III. The Chemotherapy of Malaria in relation to our Knowledge of Exoerythrocytic Forms [COATNEY & COOPER]. pp. 275–89. [84 refs.]

Since GOLGI's (1893) suggestion that human malaria parasites may, at some stage, develop in cells where they are protected from the action of antimalarial drugs, evidence to this effect has accumulated. [It is stated that the exo-erythrocytic phase in the life cycle of avian malaria parasites was established by American writers between 1944 and 1948, but surely this achievement cannot be taken away from JAMES and TATE who, as the authors state, in 1937, established the existence of the exo-erythrocytic phase in *Plasmodium gallinaceum* (this *Bulletin*, 1937, v. 34, 589; *ibid*, 1939, v. 36, 339). The subsequent work, often brilliant in conception and execution, served to confirm and amplify the newer knowledge.]

Evidence of the activity of a drug against exo-erythrocytic parasites can come in various ways, depending on whether E.E. stages are known in the parasite being investigated or whether their presence is merely inferred from indirect evidence.

For a proper understanding of the report, certain terms are defined :—

By *prophylaxis* is meant, permanent prevention of erythrocytic infection by drug action against any stage in the pre-erythrocytic cycle.

By *cure* is meant eradication of an established infection.

By *causal prophylaxis* is meant permanent prevention of erythrocytic infection by drug action during the early stages of a sporozoite-induced infection.

Very few workers have described actual morphological alterations of E.E. forms due to drug action and it is evident, therefore, that discussion on the chemotherapy of exo-erythrocytic stages of malaria must go beyond demonstrable visible effects of drugs on the parasites. There is much of this additional information available from studies on the prophylaxis and cure of both avian and human malarias.

Thousands of potential antimalarial drugs have been tested against various forms of malaria, but comparatively few have shown either curative or prophylactic action. Those which have shown such action, in varying degrees, come under six general categories: quinoline derivatives, sulphonamides, naphthoquinones, biguanides, acridone derivatives and a small miscellaneous group. Seventy-five compounds, discussed in the paper, are listed under these six heads.

From this formidable list, it is evident that the original paper must be consulted for details. These details concern chiefly the chemotherapy of avian and human malaria, since the data on simian malaria is still comparatively scanty.

The conclusions come to may be summarized very briefly as follows :—

In avian malarias, where E.E. forms have been demonstrated, some sulphonamides, naphthoquinones, biguanides, acridones, s-triazines and a pyrimidine

compound act as causal prophylactics by action against pre-erythrocytic stages. One drug alone, a naphthoquinone, will cure an established infection in which exo-erythrocytic stages are known to occur.

In monkeys with *P. cynomolgi* infections, certain 8-aminoquinolines, with or without quinine, will cure established sporozoite-induced infections.

In human malaria, only the 8-aminoquinolines and the biguanides show activity against the hypothetical exo-erythrocytic stages. The former are prophylactic and curative against both *P. falciparum* and *P. vivax*. Paludrine, the best known biguanide, is apparently prophylactic against *P. falciparum* and partially so against *P. vivax*, but it will not cure an established *P. vivax* infection.

IV. The Chemotherapy and Immunology of Pre-Erythrocytic Stages in Avian Malaria [COULSTON & HUFF]. pp. 290–99, 7 figs. on pl. [24 refs.]

Methods devised for studying the *in vivo* action of drugs on pre-erythrocytic stages of *Plasmodium gallinaceum* have been applied and the results are recorded.

Causal Prophylactic drugs

Cryptozoites.—Chickens were given sulphadiazine, sulphamerazine, sulphapyrazine, a metanilamide and a naphthoquinone, by mouth in doses much greater than those required to prevent parasitaemia after the introduction of sporozoites. Cryptozoite development was little affected, either in character or in numbers, although in the cases given sulphadiazine, naphthoquinone and metanilamide, a few " damaged " cryptozoites were seen.

Metacryptozoites.—The effect of the same drugs on the metacryptozoites was very marked, as evidenced by cytological changes, lack of development, and decreased numbers. It is therefore considered possible that the drugs acted on many of the cryptozoic merozoites only when released into the tissues.

Suppressive Drugs

Similar methods applied to the suppressive drugs quinine, quinacrine, chloroquine, pamaquin and pentaquine, gave different results. All caused morphological changes upon both cryptozoites and metacryptozoites but the proportion of parasites damaged was not so great as with the prophylactic drugs and there was no appreciable diminution in the number of metacryptozoites. The latter developed normally and produced metacryptozoic merozoites even to the extent of an occasional " flooding " effect. In the latter case, small merozoites could be seen on or in erythrocytes and it is presumed that it is at this stage that the suppressive drugs became effective.

In the discussion following the points set out above, various aspects of immunity in avian malaria are considered.

In blood-induced infections of *P. gallinaceum*, the exo-erythrocytic stages appear late in the infection reaching a maximum by the third or fourth week, long after the maximum of the erythrocytic infection and its decline by crisis if the bird survives. This difference in time of the maxima of erythrocytic and exo-erythrocytic stages presupposes almost complete independence of the two components of the picture made up by a blood-induced avian malarial infection.

In the case of sporozoite-induced infection, exo-erythrocytic forms develop prior to parasitaemia. The transition from these forms to the erythrocytic parasitaemia occurs between the 5th and 8th days and this must be considered the most important event of the life cycle because it enables the parasite to reach a new host *via* the gametocytes taken up by the insect vector.

These factors have an essential bearing on questions of natural or acquired immunity and on chemotherapy. The next point considered is the natural

immunity of various hosts to pre-erythrocytic forms of *P. gallinaceum*. Thus at one extreme the chicken shows complete susceptibility, while at the other extreme the canary shows complete immunity. Between these extremes, the duck shows partial immunity inasmuch as abundant pre-erythrocytic forms are produced, but no evident parasitaemia follows. The goose, turkey and guinea-fowl show a low grade partial immunity as evidenced by a transient parasitaemia followed by a subpatent infection. All these points indicate the existence of a barrier or threshold between pre-erythrocytic and erythrocytic parasitism and this is referred to as the tissue-blood barrier. In the cases given, it is best exemplified in the duck, where well-developed pre-erythrocytic development is not followed by patent parasitaemia.

The phenomenon of the tissue-blood barrier can be interpreted on the assumption that at least two antigen-antibody complexes are involved. In other words, natural or acquired immunity may be exerted against one or other of the two components of an infection, *viz.*, the tissue stages and the erythrocytic stages.

Thus, in the case of an immunity acquired as the result of inoculation of sporozoites and erythrocytic parasites, the later inoculation of the homologous sporozoites will result in the production of pre-erythrocytic forms although a patent parasitaemia will not follow.

The conclusion is drawn that causal prophylactic drugs produce in susceptible hosts a similar effect to that produced by natural immunity in less susceptible hosts, while suppressive drugs attack the parasite at the point where they are released from the pre-erythrocytic forms to attack the erythrocytes, and therefore act in a manner similar to the tissue-blood barrier.

V. Studies in Tissue Culture of Exoerythrocytic Schizogony in Avian Malarial Parasites [PORTER]. pp. 300–305. [16 refs.]

Attempts to grow exo-erythrocytic forms of avian malaria parasites were made early in the study of these stages.

Most of the earlier attempts at culture, such as those of HUFF & BLOOM [this *Bulletin*, 1937, v. 34, 621], GAVRILOV, BOBKOFF and LAURENCIN [*ibid.*, 1939, v. 36, 929] and HEGNER & WOLFSON [*ibid.*, 929] gave meagre success in spite of the fact that most of the parasites experimented with have exo-erythrocytic stages in macrophage cells and the latter grow readily in tissue cultures.

Much more successful results were obtained by HAWKING [*ibid.*, 1946, v. 43, 410; 1947, v. 44, 970] who used flask cultures and material rich in exo-erythrocytic stages. He utilized the technique of JACOBY [*J. Path. & Bact.*, 1944, v. 56, 438] in which small coverslips are cemented by plasma clots to the bottom of a Carrel flask. The fragments of material containing exo-erythrocytic forms were cemented to the slips by plasma clots and the covering fluid was Tyrode solution with 20 per cent. normal chicken serum and 2–6 per cent. extract of chick embryos with the addition of penicillin.

Attempts at subculture gave unconvincing results although the primary cultures were infective to chicks.

Hawking's results have been largely confirmed by ZUCKERMAN [this *Bulletin*, 1947, v. 44, 504] and the author of the paper under review. Attempts by various workers to infect cultures of normal tissues with sporozoites have been unsuccessful with the exception of some unconvincing results.

Up to the present time, studies based on the tissue culture technique are in an elementary stage and have supplied very limited information about the exo-erythrocytic stages of malarial parasites.

VI. Response of Exoerythrocytic Forms to Alterations in the Life-Cycle of *Plasmodium gallinaceum* [HAAS, WILCOX, LAIRD, EWING & COLEMAN]. pp. 306–20, 3 figs. [12 refs.]

JAMES and TATE in 1938 made the statement that " there is great irregularity in the period of infection during which the exo-erythrocytic stages are developed." Knowledge since acquired has shown that this apparent irregularity is based on varying responses to alterations in the life cycle, either natural or artificially produced.

In the present report, three such general patterns of response are described. The first pattern (A) occurs when *P. gallinaceum* is serially transmitted from mosquito to chick. In this case the exo-erythrocytic forms are at their peak about the time when parasitaemia becomes evident. This is the pattern found under natural conditions of transmission, the exo-erythrocytic forms diminishing as the erythrocytic forms increase with the result that the vertebrate host lives long enough to produce the gametocytes which are necessary for the transfer of the infection to another host *via* the mosquito vector.

Pattern B is seen in chicks infected by blood inoculation and is therefore the parasite's response to an alteration in its normal life-cycle. In this pattern there is a rapidly mounting heavy erythrocytic infection causing the death of a large percentage of chicks. In the survivors, exo-erythrocytic development is found about three weeks after the inoculation and often leads to death. A strain maintained in chick embryos by blood inoculation for 193 serial passages over a period of several years showed the same pattern when inoculated into clean chicks. Thus, out of 9 chicks inoculated, 8 died of acute parasitaemia and one survived, only to die later of exo-erythrocytic infection on the 18th day after infection.

Pattern C is again the response of the parasite to an alteration of the normal life cycle. In this pattern there is a predominance of exo-erythrocytic forms sufficiently early in the infection to kill the host before erythrocytic forms become numerous, or even before they appear at all.

This pattern has been more fully dealt with in the report with reference to the findings in brain-inoculated chicks and chick embryos.

Brain-inoculated Chicks.—Brain suspensions containing exo-erythrocytic forms were inoculated intramuscularly into chicks. These chicks show pattern C development, *i.e.* they die on the 9th to 15th day after inoculation, with heavy exo-erythrocytic development in the brain but with a very mild parasitaemia, if any. The blood from these chicks, if inoculated into fresh chicks, produced a typical pattern C infection, heavy exo-erythrocytic infection and low parasitaemia. However, if the blood was serially inoculated into chicks there was a gradual reversion of the pattern into the first phase of pattern B, with high parasitaemia and death before the appearance of exo-erythrocytic forms. Such converted B strains were very similar to B strains initiated by blood inoculation from the beginning, with the striking difference that there was an almost complete absence of gametocytes. This apparent disappearance must have been only relative, because the blood was capable of infecting mosquitoes which were infective to other chickens, producing in them infections of pattern C.

Brain-inoculated chick embryos.—The inoculation of infected brain material was made, either into the yolk sac or on the chorio-allantoic membrane, resulting in infections of C pattern. Embryos killed on the 6th to 12th days showed heavy infections with exo-erythrocytic forms and only mild parasitaemia. The curious feature in these infections was that the erythrocytic parasites were devoid of pigment. When the blood from embryos of this series was inoculated

into clean embryos and the infection of the latter maintained by sub-inoculation, there was a gradual reversion of the C pattern to B pattern in the embryos.

When embryos were infected by means of sporozoites, the C pattern was less clear cut. Thus SHORTT, MENON and IYER [this *Bulletin*, 1941, v. 38, 413], in an embryo dying 11 days after sporozoite infection, reported an extremely heavy exo-erythrocytic infection and a moderate parasitaemia, so that an earlier examination would probably have revealed exo-erythrocytic forms before the appearance of any parasitaemia.

HAAS and EWING [*ibid.*, 1945, v. 42, 539], in embryos infected by mosquito bites, found infections resembling pattern A in some and pattern C in others, while in some an intermediate condition was found in which heavy parasitaemia and many exo-erythrocytic forms were simultaneously present.

When chicks are infected by sporozoites taken from mosquito-chick passages, pattern A infection develops, but when the sporozoites come from chicks of the blood-inoculated series, pattern C infections ensue.

It is thus seen that the pattern of infection is chiefly dependent on the source of the sporozoites.

Finally, it has been shown that C pattern of development can be obtained by suppressing erythrocytic forms by quinine and then maintaining the infection in serial p ssages. *H. E. Shortt*

[For a full discussion of exo-erythrocytic schizogony in malaria, see also GARNHAM, this *Bulletin*, 1948, v. 45, 831.]

CANAPERIA, G. A. & PATRISSI, T. La malaria in Italia nel periodo bellico e post-bellico. Considerazioni epidemiologiche e misure profilattiche. [**Malaria in Italy during the War and the Post-war Period : Epidemiology and Prophylaxis.**] *Riv. di Malariologia*. 1948, Feb., v. 27, No. 1, 1–28, 8 figs. & 1 map. English summary (4 lines).

This paper describes the trends of malaria morbidity and mortality in Italy since the beginning of the century, the excessive malaria mortality that marked the close of the first world war, the rapid decline in malaria morbidity that occurred during 1935–39 to the lowest level ever recorded, and the subsequent spectacular rise in malaria incidence. In 1945, there were recorded 49,731 primary infections and 362,376 relapses as compared with 55,453 total cases in 1939. Energetic measures are once more bringing the disease under control. Early trials with DDT have produced remarkable results and the widespread use of DDT is the outstanding feature of the five-year programme of control that has been adopted by the public health authorities *Norman White*

JAFAR, M. & IYENGAR, M. O. T. **The Incidence of Malaria in a Deltaic Area of Lower Bengal between the Damodar and the Hooghly Rivers.** *Indian J. Malariology*. 1947, Dec., v. 1, No. 4, 441–67, 1 map.

This is a report of a malaria survey of a flat deltaic area of Lower Bengal comprising parts of the three districts, Burdwan, Hooghly and Howrah. There is a slight fall in the general ground level from north-west to south-east. The elevated parts have fairly effective natural drainage and contain no extensive collections of water, in spite of an annual rainfall of about 55 inches. The lower portion has very little natural drainage and contains extensive areas that hold water for several months of the year. Between November 1945 and February 1946, 372 villages were surveyed and 25,632 children were examined. The over-all spleen rate was 34·1 per cent. The proportion of plasmodial species in 87 positive blood smears was *P. falciparum* 62, *P. vivax* 28 and *P. malariae* 10.

Species of adult *Anopheles* captured, in order of frequency, were : *A. annularis, A. vagus, A. pallidus, A. aconitus, A. hyrcanus* var. *nigerrimus, A. varuna, A. ramsayi, A. philippinensis, A. subpictus, A. barbirostris* and *A. culicifacies*. *A. philippinensis* is the chief malaria vector in Lower Bengal ; it was found breeding in ponds with subaquatic vegetation and fairly clean water.

Malaria was very unequally distributed. The average spleen rate in the elevated dry areas was from 47 to 65 per cent. The low water-logged areas are comparatively free from malaria ; in one of them the spleen rate was only 0·6 per cent. These results confirm the finding previously reported by IYENGAR that a high subsoil water level acts as a deterrent to the breeding of *A. philippinensis* [this *Bulletin*, 1943, v. 40, 663 ; 1945, v. 42, 625].

The area was surveyed in connexion with a proposed Damodar-Hooghly Flood-flush Scheme, designed to improve agriculture by irrigation and drainage. The raising in the water table that is likely to result in parts of the area should result in a reduction of malaria prevalence. *Norman White*

YACOB, M. & SWAROOP, S. **Malaria and Spleen Rate in the Punjab.** *Indian J. Malariology*. 1947, Dec., v. 1, No. 4, 469–89, 3 charts.

Every year since 1914 a spleen examination of male school children under ten years of age has been carried out in all parts of the Punjab in June, before the beginning of the malaria season, and in November, toward the close of the malaria season. Some 68,000 children attending 490 schools in 260 localities have been examined each year. The very large mass of statistical information provided by these annual spleen surveys has been examined by the authors. They have not been able to show that fluctuations in spleen rates have any value in forecasting the incidence of malaria. [GILL advanced the view that " a low spleen rate in the month of June, provided the other factors are favourable, is regarded, so far as communal immunity is concerned, as favourable to the occurrence of an epidemic during the ensuing autumn." See also this *Bulletin*, 1945, v. 42, 620.] *Norman White*

VAN GOOR, W. T. Onderzoek naar de miltgrootte bij schoolkinderen in het ressort Tjiandjoer (April-Juni 1947). [**An Investigation into Splenic Enlargement in Schoolchildren in the Province of Tjiandjoer (April-June, 1947).**] *Med. Maandblad*. Batavia. 1948, July 1, No. 24, 473–83, 1 map.

During the Japanese occupation of the Netherlands East Indies, the anti-malarial measures in the province of Tjiandjoer had been almost entirely relaxed. Much ground had been allowed to become fallow, vegetation was not cleared and planting regulations, especially as regards rice, together with irrigation schemes, had fallen into disuse. Conditions were thus ideal for the breeding of *Anopheles aconitus* and the spread of malaria.

It was decided to carry out a survey of splenic enlargement in schoolchildren in an attempt to assess the present prevalence of malaria. Some 3,800 children were examined in 52 localities and the spleens classified as " absent," " small " (half way to the umbilicus), " moderate " (reaching to the umbilicus) and " large " (below the umbilicus). The proportions over the whole province were :—

Absent	1,522 cases	40 per cent.
Small	1,152 ,,	30 ,, ,,
Moderate	975 ,,	26 ,, ,,
Large	151 ,,	4 ,, ,,

The average splenic index was thus 60 per cent. For boys the index was 60 per cent., for girls 52½ per cent. (only 3,116 cases were available for analysis).

The splenic index varied considerably in different parts of the territory. On the high ground (up to 1,200 metres) it was of course lower, but even here reached 24 per cent. In some areas, however, it reached 100 per cent.

These figures are compared with previous years for certain areas. For those where complete figures are available the average splenic indices were :—

1919	1922	1931	1941	1947
90	67·5	11	5	47

Thus though much ground has been lost the situation is not as bad as it was thirty years ago. *A. L. Winner*

ANDREWS, J. M. **What's happening to Malaria in the U.S.A. ?** *Amer. J. Pub. Health.* 1948, July, v. 38, No. 7, 931–42, 5 figs. [40 refs.]

The general decline of malaria in the U.S.A. began during the last quarter of the 19th century. Then the disease was widespread over the eastern two-thirds of the country. During the present century the declining incidence has been interrupted every 5 to 7 years by seasons of increased transmission. The last of these cyclic waves of increased transmission occurred in the mid-1930's. By then endemic malaria areas had contracted to the south-eastern States. Since that last period of enhanced transmission, malaria prevalence has steadily and continuously declined in the U.S.A. The author considers in turn the possible influences that may have determined this remarkable downward trend.

There has been no deterioration in the potentialities of the parasite-host-vector system of malaria transmission during the last twelve years : changes have been quantitative rather than qualitative. In certain areas, antilarval measures may have diminished malaria endemicity but it is doubtful whether such measures were primarily responsible for the regional decrease. The reduction of domestic densities of anophelines by insecticides, by insect-proofing of houses and as a result of anopheline deviation by cattle is probably a more important causal factor. Population movements from endemic areas of the south to malaria-free areas, and improved antimalaria medication have contributed to the decline. Economic advance has stimulated the development of most of these factors.

Control techniques are continually being improved. If advantage be taken of the present favourable conditions, the complete eradication of malaria from the United States is within the bounds of possibility. *Norman White*

GREENWALD, Margaret, COCHRAN, J. H. & SCHARFF, D. K. **Large-Scale Rearing of *Anopheles quadrimaculatus*, Say, at Orlando, Florida.** *Mosquito News.* 1948, June, v. 8, No. 2, 50–56, 6 figs.

In this paper the authors give a complete description of their equipment and methods of management of a large successful laboratory colony of *Anopheles quadrimaculatus* at Orlando, Fla., which is capable of a daily output of 40,000 adults, 5,000 larvae and over 100,000 eggs. This colony has been developed from the original methods described by Boyd *et al.* in 1935. The reader is given all information he is likely to need as to the sizes and kinds of equipment and the various daily routines. Such detail cannot be summarized but the following points are of particular interest.

In addition to an indoor unit totalling 975 square feet there is also, at Orlando, an outdoor unit of 40 rearing boxes maintained in a stream. The authors have found that the ideal temperature for larval development is 80 to 82°F. (26·5 to 27·5°C.) and that exposure to daylight is not essential. It is extremely

important that the amount of food given to the larvae, and the feeding times, should receive special and continuous attention. The cages of adults which are kept at 84°F. (29°C.) should be protected from draughts, bright lights and extremes of temperature. At Orlando, the natural humidity is so high that humidity control in the insectaries is unnecessary. Eggs can be stored in an ice-box, where they remain viable for ten days. Some of the equipment and procedures are illustrated by photographs. *H. S. Leeson*

NOE, J. & MANN F., G. Disminución invernal del anofelismo en Tarapacá. [**Great Reduction in Winter of Anophelines in Tarapaca, N. Chile.**] *Biologica*. Santiago. 1946, Dec., No. 5, 3–12, 4 figs. on 2 pls. English summary.

In the region of Tarapaca in Northern Chile, rain falls in the summer and *Anopheles pseudopunctipennis* breeds in the streams. With the advent of cold weather the rains cease and the streams dry up, becoming a series of isolated pools. Perhaps because the water is stagnant, the filamentous algae, which appear to be the principal food of the *Anopheles* larvae, die and masses of dead algae become invaded by putrefactive bacteria. Water becomes so foul that *Anopheles* larvae and many other insects and other organisms are killed in large numbers.

After winter, when the temperature again begins to rise, ice melts in the upper Andes so that the streams begin to run again. The filamentous algae grow and an abundant population of *Anopheles* larvae appears. We have endeavoured to summarize the facts : the authors have worked out an ingenious explanation which involves a consideration of water chemistry and many other matters. *P. A. Buxton*

DALENCOUR, L. **Hedges of** *Bromelia pinguin* **L. A Source of Mosquito Breeding in Haiti.** *Mosquito News*. 1948, Sept., v. 8, No. 3, 109–10.

CLÉMENT, R., GERBEAUX, J. & SATGÉ, P. Trois observations parisiennes de paludisme acquis du nourrisson. Endomyopéricardite dans un des cas. [**Three Cases of Acquired Malaria in Infants in Paris : Endomyopericarditis in One Case.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1948, Nos. 24/25, 889–96, 1 fig. [24 refs.]

The three cases of malaria described concerned infants of two, six and eleven months of age respectively. The first had recently arrived from the Cameroons, but the other two had never been away from Paris. All three cases presented diagnostic difficulties. The youngest child had symptoms of acute enteritis and it was only on the ninth day of illness that *P. vivax* was found in the blood ; he recovered. In the second child *P. vivax* malaria complicated a diphtheritic rhinopharyngitis ; the diagnosis of malaria was made too late to avert a fatal issue.

The third child died with endocarditis, myocarditis and pericarditis and a heavy infection of *P. falciparum*. Sections of the myocardium showed an abundance of malarial pigment. Haemocultures had been constantly negative. A normal sedimentation rate and the blood counts appeared to negative a septicaemic origin of the cardiac lesions. The occurrence of a *P. falciparum* infection in an infant who had never been outside Paris is in itself a remarkable happening. *Norman White*

HANNS, A. & MUGLER, A. Le paludisme des rapatriés de Russie. Son apparition tardive. Sa latence intercalaire. [**Malaria among Persons repatriated from Russia : its Late Appearance and Prolonged Latency.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1947, Nos. 34/35, 1033–7.

The authors have had in their hospital in Alsace 26 patients suffering from *P. vivax* malaria which had been contracted several months or a year previously in Russia. These men had been impressed into the German army, been made prisoners by the Russians and most of them had been interned in the concentration camp at Tambov where they had passed a year or eighteen months. Tambov is in a marshy malarious area near the centre of Russia. They were repatriated in the autumn of 1945 in a miserable condition. Their condition steadily improved after their return home till the return of the warmer weather, when malaria suddenly attacked them. In only 8 of the 26 cases was there any history of febrile episodes that might possibly have been caused by malarial infection.

The authors discuss the possible reasons for the prolonged latent periods in these cases and for the fact that few or any of them had suffered from clinical malaria in Russia. They advance the hypothesis that their state of extreme debility and malnutrition may have been responsible ; it was only when they had regained a more normal state of health that their bodies were able to react against the malaria parasite. *Norman White*

HANNS, A. & MUGLER, A. Le paludisme des rapatriés de Russie. (Deuxième communication.) [**Malaria in Persons repatriated from Russia.**] *Bull. et Mém. Soc. Méd. Hôpit de Paris.* 1948, Nos. 24/25, 818–21.

The authors describe difficulties in diagnosis that have been experienced in the case of sufferers from malaria who have been repatriated from Russia to Alsace where there is no endemic malaria. Many of these have been primary attacks of malaria after prolonged incubation periods For the most part the cases have been mild. Certain patients with disquieting renal, cerebral or hepatic symptoms had organs that had been damaged by previous disease. The symptoms were protean. Lumbar pains sometimes extremely violent, severe headache, irregular fever, and dissociation of pulse and temperature were frequently observed. All infections were due to *P. vivax*. Clinical attacks yielded promptly to quinine or mepacrine. *Norman White*

MARCHIONNI, M. Un caso di rottura spontanea della milza in malarico. [**A Case of Spontaneous Rupture of a Malarial Spleen.**] *Riv. di Malariologia.* 1948, Feb., v. 27, No. 1, 41–6. [11 refs.] English summary (2 lines).

This describes an unusual case of rupture of an enlarged spleen, the occurrence of which was not suspected until laparotomy revealed the true state of affairs. On admission to hospital the patient must have had a small subcapsular rupture of the spleen, which was not diagnosed. This haematoma seems to have enlarged slowly during the following night, causing the spleen capsule to rupture while the patient slept. The symptoms then suggested the perforation of a gastric ulcer ; the pulse rate was only 90. When operation disclosed the nature of the lesion the patient's condition was too grave to allow splenectomy to be attempted. The laceration was sutured and plugged, and a drainage tube left in. The patient eventually recovered. *Norman White*

HEILIG, R. & SHARMA, G. C. **Presumptive Malarial Pneumonia.** *Indian Med. Gaz.* 1948, Mar., v. 83, No. 3, 116–23, 6 text figs. & 9 figs. on 2 pls. [12 refs.]

Five cases of malarial pneumonia are described in detail. The physical and radiological findings were those of typical lobar pneumonia, but in four cases the temperature was remittent. They differed from pneumococcus lobar pneumonia inasmuch as the administration of sulphonamide drugs, and in two cases of penicillin, failed to influence the general condition, temperature or lung consolidation; antimalarial therapy, on the other hand, produced rapid defervescence and quick general improvement. *P. vivax* was found in two cases; the malaria flocculation test was positive in all five. All five patients had some splenic enlargement. *Norman White*

WINCKEL, C. W. F. La diminution du nombre des rechutes du paludisme par le traitement avec la quinine et la plasmoquine. [**Reduction of Malarial Relapses by the Use of Quinine and Plasmoquine.**] *Rev. Paludisme et Méd. Trop.* 1948, Nov. 15, v. 6, No. 54, 257–67. [Refs. in footnotes.]

A general review.

MANFREDI, M. Prove di trattamento con Paludrina (Farma 01015) nella malaria da vivax. [**Treatment of *P. vivax* Malaria with Paludrine.**] *Acta Med. Italica.* 1948, Aug., v. 3, No. 8, 205–8. English summary.

The results of paludrine treatment in 61 patients suffering from *P. vivax* malaria in Elba are recorded. As a control, 130 patients were treated with mepacrine. The conclusion is reached that the two drugs are equally effective, but the absence of symptoms of intolerance which characterizes treatment with paludrine makes that drug to be preferred. Large doses are not recommended: 0·30 gm. a day for four days is sufficient. *Norman White*

ROGNONI, M. & PUYOL, L. M. Informe de los primeros 15 casos tratados con paludrina en el Hospital Santo Tomás. [**The First 15 Cases of Malaria treated with Paludrine in St. Thomas Hospital, Panama.**] *Archivos Hospital Santo Tomas.* 1947, July–Dec., v. 2, Nos. 3, 4, 391–6.

Fifteen cases of malaria, 5 *P. vivax*, 8 *P. falciparum* and 2 mixed infections, were treated with paludrine, with satisfactory results. A total dose of 1·5 gm., spread over 3 consecutive days, is an effective rapid form of treatment for an adult, free from risk of toxic manifestations. Fever is controlled within the first three days and trophozoites disappear from the peripheral blood within 48 to 72 hours from the beginning of treatment. *Norman White*

KING, F. E., ACHESON, R. M. & SPENSLEY, P. C. **Benziminazole Analogues of Paludrine.** *J. Chem. Soc.* 1948, Sept., 1366–71.

BAMI, H. L., IYER, B. H. & GUHA, P. C. **Studies in Antimalarials. Part IV. Ammonolysis of Aliphatic Ketones with Hydrogenation.** *J. Indian Inst. Sci.* 1947, v. 29A, Pt. II, 9–14.

BAMI, H. L., IYER, B. H. & GUHA, P. C. **Studies in Antimalarials. Part V. Some Sulphabiguanide Derivatives.** *J. Indian Inst. Sci.* 1947, v. 29A, Pt. 3, 15–22.

BAMI, H. L., IYER, B. H. & GUHA, P. C. **Studies on Antimalarials. Part VI. Sulphabiguanide Derivatives.** *J. Indian Inst. Sci.* 1948, v. 30A, Pt. 1, 1–7.

BAMI, H. L., IYER, B. H. & GUHA, P. C. **Studies in Antimalarials. Part VII. Metachloridine Substituted Arylbiguanides.** *J. Indian Inst. Sci.* 1948, v. 30A, Pt. 2, 9–13.

BAMI, H. L. **Studies in Antimalarials. Part VIII. Aryl-Cyanoguanidines from Aryl-Azo Cyanoguanidines.** *J. Indian Inst. Sci.* 1948, v. 30A, Pt. 3, 15–26.

FIESER, L. F. & others. **Naphthoquinone Antimalarials. I. General Survey.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3151–5, 1 fig. [Refs. in footnotes.]

FIESER, L. F. & RICHARDSON, A. P. **Naphthoquinone Antimalarials. II. Correlation of Structure and Activity against** *P. lophurae* **in Ducks.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3156–65, 3 figs.

FIESER, L. F. **Naphthoquinone Antimalarials. III. Diene Synthesis of 1,4-Naphthoquinones.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3165–74. [Refs. in footnotes.]

FIESER, L. F. & others. **Naphthoquinone Antimalarials. IV–XI. Synthesis.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3174–80, 2 figs. [Refs. in footnotes.]

FIESER, L. F. & FIESER, Mary. **Naphthoquinone Antimalarials. XII. The Hooker Oxidation Reaction.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3215–22.

LEFFLER, M. T. & HATHAWAY, R. J. **Naphthoquinone Antimalarials. XIII. 2-Hydroxy-3-substituted-aminomethyl Derivatives by the Mannich Reaction.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3222–3.

ZAUGG, H. E., RAPALA, R. T. & LEFFLER, M. T. **Naphthoquinone Antimalarials. XIV. 2-Hydroxy-3-aryl-1,4-naphthoquinones.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3224–8. [Refs. in footnotes.]

FIESER, L. F., ETTLINGER, M. G. & FAWAZ, G. **Naphthoquinone Antimalarials. XV. Distribution between Organic Solvents and Aqueous Buffers.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3228–32, 1 fig.

FIESER, L. F. **Naphthoquinone Antimalarials. XVI. Water-Soluble Derivatives of Alcoholic and Unsaturated Compounds.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3232–7. [Refs. in footnotes.]

FIESER, L. F. **Naphthoquinone Antimalarials. XVII. Chromic Anhydride Oxidation.** *J. Amer. Chem. Soc.* 1948, Oct., v. 70, No. 10, 3237–44, 1 fig.

FIESER, L. F., CHANG, F. C., DAUBEN, W. G., HEIDELBERGER, C., HEYMANN, H. & SELIGMAN, A. M. **Naphthoquinone Antimalarials. XVIII. Metabolic Oxidation Products.** *J. Pharm. & Exper. Therap.* 1948, Oct., v. 94, No. 2, 85–96.

HEYMANN, H. & FIESER, L. F. **Naphthoquinone Antimalarials. XIX. Antirespiratory Study of Protein Binding.** *J. Pharm. & Exper. Therap.* 1948, Oct., v. 94, No. 2, 97–111.

FIESER, L. F., HEYMANN, H. & SELIGMAN, A. M. **Naphthoquinone Antimalarials. XX. Metabolic Degradation.** *J. Pharm. & Exper. Therap.* 1948, Oct., v. 94, No. 2, 112–24.

MADRAS, GOVT. OF: **Soil Erosion—its Prevention and Control.** pp. xii+184, 158 figs. & 1 folding map. 1948. Madras. Govt. Press. [6 rupees.]

This book, compiled by the former Chief Engineer for Irrigation, and the Heads of the Departments of Irrigation, Agriculture, Forestry and Public Health, Government of Madras, is intended primarily for departmental officers and for teaching agriculture and forestry. Most of the figures are from photographs taken in Madras, the United States of America and other countries.

In the final chapter, on erosion and malaria, it is pointed out that the problem of erosion and its control is in fact one of regulating the flow of water, and therefore has an important bearing on malaria. After an introductory account of malaria and its transmission, some effects of erosion are mentioned; by making ground uneven and by promoting scouring and intermittent flow in streams it causes pools to form, and by increasing run-off from hills it floods lower land. An account of engineering methods of mosquito control, familiar to malariologists, follows. On page 153 "varieties" of mosquitoes would better be written as genera, and on page 160 the "filling of all points" perhaps refers to ponds.

To medical officers of health the main body of the book should be useful in showing what is being done to check erosion. They can then foresee any consequent increase of potential breeding places of mosquitoes, for example in water held up by certain types of terraces and dams, and can plan control measures accordingly. *D. J. Lewis.*

FLETCHER, O. K., Jr. **Ducks as Mosquito Predators.** *J. National Malaria Soc.* 1948, Sept., v. 7, No. 3, 186.

During routine malaria control inspections on a plantation in Dougherty County, Georgia, in the summer of 1946, the author noted that a certain pond had a particularly dense population of mosquito larvae, especially those of *Anopheles quadrimaculatus* and, to a lesser extent, of *A. crucians* and others. The pond measures some 1·5 acres in extent and the whole surface is covered with vegetation and floatage, thus lending itself readily to larval survival. Throughout the summer, larval densities in this pond increased to a maximum of 35 per square foot of breeding area on October 1st.

A few days later, a flock of 93 large white Peking ducks were turned into the pond to graze: at the next inspection, ten days afterwards, not a single mosquito larva and no edible floatage could be found. It was evident that the ducks "had performed a thorough job of eradication", and no more larvae were found as long as they remained there.

The persistence of large numbers of larvae in comparable ponds excludes seasonal decline as an explanation; furthermore, no larvicides had been applied to the pond during 1946. As this pond is the only important one within flight range of human dwellings on the plantation, it would seem that the feeding activities of the ducks had made "an appreciable contribution to malaria control."

The only reference to such activities which the author has been able to find has been in a current naturalist's publication, where it is stated that the Mallard Duck ingests substantial quantities of mosquito larvae. The present author points out, however, that predations of wild ducks on mosquito larvae are of little significance in the malarious regions of the south, since their sojourn there is largely restricted to the winter months. [But the use of such ponds, when they are present, by domestic ducks might well be encouraged.]

H. J. O'D. Burke-Gaffney

FLORIS, M. Relazione sulla campagna antimalarica 1947 nella Provincia di Cagliari. [**Antimalaria Campaign of 1947 in the Province of Cagliari.**] *Riv. di Malariologia.* 1948, Feb., v. 27, No. 1, 29–40, 5 charts & 1 map. English summary (3 lines).

The detailed description of the antimalaria campaign of 1947 in the Cagliaria Province, Sardinia, is of more local than general interest. Malaria prevalence was remarkably lower than in the previous year. In 1947 there were recorded 6,062 cases of malaria, of which only 993 were fresh infections: in 1946 there were 17,135 reported cases, of which 3,380 were fresh infections. Another remarkable contrast with previous years was the greater prevalence of *P. vivax* than of *P. falciparum* infections; positive *P. vivax* films numbered 823 as compared with 611 *P. falciparum*. These results are attributed to the DDT treatment of houses. It is interesting to note that fresh infections were most numerous in 1947 in the months of July and August. At this season agricultural activity is at its height and many country folk spend the nights in open country without any protection against the attacks of mosquitoes.

Norman White

BALL, E. G., MCKEE, R. W., ANFINSEN, C. B., CRUZ, W. O. & GEIMAN, Q. M. **Studies on Malarial Parasites. IX. Chemical and Metabolic Changes during Growth and Multiplication** *in vivo* **and** *in vitro*. *J. Biol. Chem.* 1948, Sept., v. 175, No. 2, 547–71. [23 refs.]

This series of papers deals with the growth and multiplication of malarial parasites. The present report describes the chemical and metabolic changes which have been observed in the red cells of monkeys during the growth of *P. knowlesi in vitro* and *in vivo*. Some of the results confirm those of earlier authors. [For summaries of preceding papers, in which the techniques employed are described, see this *Bulletin*, 1945, v. 42, 867; 1947, v. 44, 17, 649, 1043.] The changes occurring have been based on those taking place in a standard number of red cells, and are correlated with both the number and size of the parasites present. As other authors have pointed out, parasites grown *in vivo* caused a large rise in glucose and oxygen consumption over normal red cells but it has not been observed to the same extent with parasites grown *in vitro*. The ratio of moles of glucose to moles of oxygen consumed was approximately unity. The glucose was mostly converted to lactic acid. There was a more constant rise in fatty acid and in the various phosphorus fractions in parasitized cells grown *in vivo* than in those grown *in vitro*, which the authors believe may be explained by the lack of certain nutrient factors in the culture medium. The increase in nucleic acid phosphorus partly identified as of desoxyribose type was noteworthy. It is believed that *in vitro* the parasite can synthesize nucleic acid from certain components if supplied, but whether it can synthesize all the purines and pyrimidines has still to be determined. Experimental evidence does suggest that adenine can be synthesized. It was not clearly determined whether the co-enzyme flavin-adenine dinucleotide was synthesized by *P. knowlesi in vitro*, since normal monkey cells in similar circumstances can synthesize this substance. The generally accepted view is that the parasite converts at least some haemoglobin of the host cell to haematin. Quantitative estimations have shown that during its life cycle *in vivo*, *P. knowlesi* destroys nearly all the haemoglobin of the host cell and retains the haematin formed. Comparable results were obtained *in vitro*, but in neither case was the mechanism of the degradation determined.

J. D. Fulton

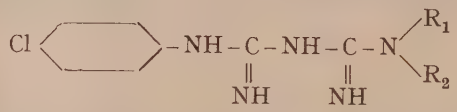
WILLIAMSON, J. **A Nomogram for the preparation of Standard Inocula in the Davey Chick Test of Antimalarial Activity.** *Ann. Trop. Med. & Parasit.* 1948, Sept., v. 42, No. 2, 238–40, 1 diagram.

In the antimalarial test against *P. gallinaceum* in chicks described by DAVEY [this *Bulletin*, 1946, v. 43, 712] an inoculum containing 50×10^6 parasites in 0·20 cc. was used. The present author has constructed a nomogram for the rapid determination of dilution factors in the preparation of the required inoculum. The data used in its construction are : (*a*) the number of red blood cells in millions per cmm., and (*b*) the number of parasitized r.b.c. per 500 r.b.c. in the infected blood. The required dilution c was obtained from the equation ab=125c. The nomogram is figured as three parallel straight lines. The outer scales represent the values of a and b and by laying a ruler across the appropriate values, the point of intersection with the middle scale c gives the required dilution factor.

J. D. Fulton

SPINKS, A. **Studies on Synthetic Antimalarial Drugs. XX. The Blood Concentrations and Physiological Distribution of some Homologues of Paludrine in relation to their Antimalarial Activities.** *Ann. Trop. Med. & Parasit.* 1948, Sept., v. 42, No. 2, 190–97. [18 refs.]

The antimalarial drug paludrine has the following constitution :—



where R_1=H and R_2=C_3H_7 (isopropyl). It has been found that a number of closely related compounds show wide variation in activity against blood forms of *P. gallinaceum* in the chick. A high dosage of two compounds—(*a*) R_1=H and R_2=CH_3 and (*b*) R_1 and R_2=CH_3 proved completely inactive in the same infection. The tissue distribution, blood and plasma levels of a number of these paludrine homologues have been compared directly with that drug under standard conditions in the rabbit, rat and chick. Each drug was given as an aqueous solution of the hydrochloride, orally to rat and chick and intravenously to rabbits. Tissue samples were obtained at intervals for analysis by the method of SPINKS & TOTTEY [this *Bulletin*, 1946, v. 43, 707]. In the rat and chick, there was an increase in blood concentration with decreased molecular weight of the homologues. The concentration in blood in chick and rat of one inactive homologue was higher than that of paludrine, but members of the series exhibited no differences regarding rate of disappearance from that tissue. In other tissues the distribution of the homologues was similar, and the low therapeutic activity of some cannot be explained by poor absorption or low concentration in cells.

J. D. Fulton

ROLLO, I. M., WILLIAMSON, J. & LOURIE, E. M. **Acquired Paludrine-Resistance in *Plasmodium gallinaceum*. II. Failure to produce such Resistance by Prolonged Treatment of Latent Infections.** *Ann. Trop. Med. & Parasit.* 1948, Sept., v. 42, No. 2, 241–8. [19 refs.]

It has been shown by BISHOP & BIRKETT and by the present authors [this *Bulletin*, 1947, v. 44, 969, 970] that *P. gallinaceum* becomes highly resistant to paludrine by treatment of the infected chick host with the drug over a period of a few months. In the present investigation an attempt was made to produce a similar resistance by treatment directed against exo-erythrocytic forms of the parasite. The work of DAVEY [*ibid.*, 646] showed that paludrine

possessed a limited activity against these forms. Treatment of chickens, infected by mosquito bite, was begun with paludrine three days after the disappearance of parasites from the blood and was continued up to a period of 52 weeks. The initial dosage was 0·25 mgm. per 50 gm. body weight given twice daily on 6 days per week. At various intervals subinoculations were made into fresh hosts with the blood of the treated birds, and tests were made to find if resistance had been acquired by the parasites. In some cases latent infections in the subinoculated birds were similarly treated, but in no case did resistance appear to have developed. Reasons for this failure are suggested and its bearing on human malaria is discussed. *J. D. Fulton*

BISHOP, Ann & MCCONNACHIE, Elspeth W. **Resistance to Sulphadiazine and 'Paludrine' in the Malaria Parasite of the Fowl** (*P. gallinaceum*). *Nature*. 1948, Oct. 2, 541–3.

It has been shown by BISHOP & BIRKETT and by WILLIAMSON *et al.* [this *Bulletin*, 1947, v. 44, 969, 970] that a forty-fold resistance to paludrine can be induced in *P. gallinaceum* maintained in young chicks. A comparable resistance to sulphadiazine has now been produced in the same parasite after 12 months' treatment with the drug, which involved resistance to other drugs of the same series. Exo-erythrocytic forms were present during the period of treatment. Resistance to paludrine and to sulphadiazine was unaffected by passage through the mosquito vector. The sulphadiazine-resistant strain developed simultaneous resistance to paludrine. A strain resistant to paludrine which had long been maintained in contact with that drug was also resistant to sulphadiazine. It appeared from experimental evidence that long contact of *P. gallinaceum* with paludrine was necessary before the latter resistance was developed

J. D. Fulton

GREENBERG, J., BOYD, B. L. & JOSEPHSON, E. S. **Synergistic Effect of Chlorguanide and Sulfadiazine against** *Plasmodium gallinaceum* **in the Chick.** *J. Pharm. & Exper. Therap.* 1948, Sept., v. 94, No. 1, 60–64.

It has been shown by several authors [this *Bulletin*, 1945, v. 42, 353, 699] that sulphadiazine has a true causal prophylactic action against *P. gallinaceum* in the chick. The interesting observation is made that, in the authors' experience, it has been necessary to increase fourfold, since 1944, the dose of sulphadiazine required to give complete protection. Chlorguanide [paludrine] was reported to have a similar causal prophylactic action in this infection [this *Bulletin*, 1946, v. 43, 400]. The effect of simultaneous administration of the two drugs in sporozoite-induced infections of *P. gallinaceum* has been investigated. It was found that at a certain combined dosage complete protection to chicks was afforded, whereas the same dose of each drug given alone failed to effect this result. A similar increased activity was also noted in blood-induced infections with the same parasite by combined administration of the two drugs. The effective dose of paludrine when given with 1/32 to 1/62 the effective dose of sulphadiazine was only $\frac{1}{4}$ of the dose required when given alone, in the two types of infection. The subacute toxicity for chicks of the drugs in combination was additive. The plasma levels of sulphadiazine, for a definite dosage, were increased up to 100 per cent. by concurrent administration of paludrine, but this fact did not account for the increased protection afforded by simultaneous administration of the two drugs. Moreover, the plasma levels of paludrine were not altered by the concurrent administration of sulphadiazine. Investigations are being continued to find out whether a similar increased activity is caused by combination of paludrine with other sulphonamides and also the mechanism of producing the increased activity. The authors point

out that a similar potentiation of effect would be of great value in bacterial infections and in human malaria. [These results obtained by combined therapy of paludrine and sulphadiazine are of great interest when considered in conjunction with the experiments of BISHOP & MCCONNACHIE (see above), who found that a sulphadiazine-resistant strain of *P. gallinaceum* developed simultaneous resistance to paludrine. They also found that a strain long resistant to paludrine and maintained in contact with that drug was likewise resistant to sulphadiazine. The evidence so far available suggests that long contact of *P. gallinaceum* with paludrine was necessary before resistance to sulphadiazine develops.] *J. D. Fulton*

BUSH, D. L. **Experimental Transmission of the "3M" Strain of** *Plasmodium cathemerium* **to the Duck and its Chemotherapeutic Suitability for Routine Antimalarial Screening.** *J. Parasitology.* 1948, Aug., v. 34, No. 4, 321–31, 3 graphs. [26 refs.]

The strain of *P. cathemerium* described here, which had previously been maintained in canaries, was found to adapt itself readily to the duck host, but not to the chick. When 10^6 parasites per gm. weight were given intravenously, the peak of parasitaemia occurred on the 4th day. The infection showed considerable virulence and produced marked anaemia, but virulence was not increased by more than 300 passages. Periodicity was of 24 hours' duration and marked synchronicity was exhibited on the first and second day of infection, but not around the peak of infection. The number of merozoites per segmenter on the 4th day was 6 to 24, with a mean value of approximately 12. There was marked destruction of parasites around the peak period and thereafter parasites rapidly disappeared from the blood. Exo-erythrocytic stages of the parasites could not be demonstrated. In therapeutic tests the drugs were administered in the food and the birds were kept on a 4-hour light and dark schedule. Treatment was started 24 hours before intravenous injection with $1{\cdot}5 \times 10^6$ parasites per gm. weight. The strain was not susceptible to sulphadiazine. The morphological changes induced in the parasites by standard drugs and others are described. It is suggested that the duck is a suitable host for use in antimalarial screening tests with this strain of parasite. *J. D. Fulton*

BLACKWATER FEVER

POURSINES, Y. & MOUSTARDIER, G. Lésions histologiques de rein dans la fièvre bilieuse hémoglobinurique. Contribution à l'étude du mécanisme de l'anurie. Déductions thérapeutiques. [**Histological Study of the Mechanism of Anuria in Blackwater Fever and its Therapeutic Implications.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 553–8.

One of the authors recently studied blackwater fever in French Equatorial Africa. In most of the cases discussed blackwater fever appeared during an exacerbation of chronic malaria. The clinical picture was characteristic—oliguria developing into anuria with final uraemia. In one case there was persistent severe anaemia with normal kidney function.

The histological work described in this paper is based on the examination of tissues from three patients who died in uraemia. About 10 to 15 per cent. of the uriniferous tubules contained compact "plugs" of a brown substance staining brick-red with eosin and containing no free iron. These "plugs" were common in the excretory part of the tubules, but were not seen in the

secreting portion where there was only some protoplasmic débris or an eosinophilic substance which was very little condensed. A striking feature was the retraction of the glomerular tufts with a corresponding apparent increase in the size of Bowman's cavity. In some glomeruli there was a cubical change in the epithelium of Bowman's capsule. The authors were struck with the absence of mesenchymal inflammatory lesions, either acute or chronic. There was venous congestion and oedema of the medulla and the renal blood vessels contained few red cells which were often "*perdus dans une substance hyaline.*"

The authors conclude from the fact that the majority of the renal tubules appeared to be open and not obstructed by "plugs" that the "blockage" theory of the pathogenesis of anuria cannot be maintained. They suggest that the retraction of the glomerular tuft follows a vaso-constriction within the tuft, presumably reflex, which results in the failure of the filtration of plasma across the glomerular membrane. This failure of filtration would account for the anuria.

On the grounds of the possible reflex origin of anuria, the authors recommend the use of intravenous novocaine (without adrenaline) in oliguric and anuric cases. They suggest two or three injections of 5 to 10 ml. of 1 per cent. novocaine given slowly in the course of 24 hours. Hypertonic saline (10 per cent.) may be administered simultaneously. In cases where this fails to produce diuresis, direct "infiltration" of the renal "pedicles" is suggested.

The authors state that intravenous novocaine has given extremely good results in cases of anuria. All cases cannot be cured by this method, but they believe that in blackwater fever, where anuria is so often fatal, this physiological therapeutic method should be used as a routine, accompanied by anti-haemolytic treatment.

[It is not quite clear whether the authors are referring to their own results in the treatment of renal complications of blackwater fever, or whether they are making a general statement when they say that intravenous novocaine has relieved cases of anuria. If they are indeed referring to blackwater fever, this paper is important because it is the first report of such treatment in that disease. The suggestion that the "renal pedicles" should be "infiltrated" seems rather drastic.

The authors make no reference to the very large literature on the subject of acute renal failure which has accumulated in the last decade. The theory of renal anoxia, so like their own, appears to be unknown to them.]

B. G. Maegraith

LANGUILLON, J. Le facteur Rh dans la fièvre bilieuse hémoglobinurique. [**The Rh Factor in Blackwater Fever.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 470–73.

The author discusses the theory that the Rh factor is concerned in the pathogenesis of blackwater fever [see this *Bulletin*, 1946, v. 43, 533]. He points out the similarity between the clinical and pathological pictures of incompatible transfusion and blackwater fever, and refers briefly to the evidence supporting the view that the malarial plasmodium may act as an antigen. He suggests that the malaria parasite contains a substance capable of sensitizing Rh negative individuals in the same way as in transfusion with Rh positive blood, or an Rh positive foetus. This sensitization is increased by repeated attacks of malaria and eventually sets off a haemolytic crisis which appears clinically as blackwater fever. His arguments in favour of this theory are as follows:—(*a*) Four settlers in the New Hebrides who developed blackwater fever were all Rh negative. (*b*) Blackwater fever is unknown amongst the indigenous population of the New Hebrides, all of whom, according to the author, are Rh positive.

(*c*) Cases of blackwater fever occurring in the same family could be explained on the grounds of the hereditary transmission of the Rh factor. Two examples of multiple cases of blackwater fever in one family are reported.

In the discussion following the presentation of this paper there are some interesting comments. GIRARD pointed out that something like 800 aborigines had been examined and were all Rh positive. DÉCOURT thought the presence or absence of the Rh factor in human blood could not by any means be the sole cause of the development of blackwater fever. For example there was no blackwater fever in North Africa where malaria was highly endemic and the incidence of the Rh factor was the same as in countries where blackwater fever occurred. *B. G. Maegraith*

TRYPANOSOMIASIS

FORD, J., WHITESIDE, E. F. & CULWICK, A. T. **The Trypanosomiasis Problem.** Reprinted from *East African Agric. J.* 1948, Apr., v. 13, No. 4, 187–94. [18 refs.]

The authors examine the problem of African trypanosomiasis as a whole. They recognize three lines of approach, through the trypanosome, the tsetse, and by way of a broad ecological view. They try to avoid prepossessions, and have produced a valuable, stimulating paper, which has a new look.

The authors enter the subject by summarizing what is known of the trypanosome and the tsetse, and calling attention to what is unsolved. They are interested in the possibility of immunizing against trypanosomes, though the difficulties are stated. They emphasize the need for thinking quantitatively about fly populations, and are prepared to discuss measures for reduction rather than extermination of tsetse. They are insistent, rightly, that much more thought should be given to *Glossina* as a vector of trypanosomiasis.

The most original part of the paper discusses the " broad ecological approach which seeks so to modify the whole environment that it becomes inimical to the continuance " of trypanosomiasis. The authors focus attention not on individual organisms but on populations of cattle, men and fly and on their inter-relationships. They suggest that wars and European penetration introduced new problems and diseases (rinderpest, smallpox). Old ways of using land and old pastoral customs were replaced by groundnuts, lorries, main roads and freedom of movement. This produced a " vast biological disequilibrium ". [There is left an impression that this part of the picture is not yet quite in focus. The authors have put together many fragments of evidence supporting their view, and with further work it may become more concrete and precise. Certainly they have performed a service in calling attention to the need to give more time and study to the Africans' habits, as an integral part of the epidemiology.] *P. A. Buxton*

GEIGY, R. Elevage de *Glossina palpalis*. [**Rearing of** *Glossina palpalis*.] *Acta Tropica*. Basle. 1948, v. 5, No. 3, 201–18, 8 figs.

The paper carries on the story of the cultivated strain of *Glossina palpalis* which has been maintained for some time in Switzerland. The paper describes and figures the author's methods for feeding and maintaining his large culture of tsetse. The system is evidently remarkably efficient and appears to be capable of indefinite extension as the number of flies increases. It is labour-saving, for one laboratory assistant can look after a couple of thousand flies, giving three to four hours to it every day : in that time she can feed them and collect pupae and dead flies.

Several distinct cultures have been maintained. One of them contained ninety-eight females and a number of males, which were brought from the Congo in October, 1945 ; a few pupae were added to it soon afterwards. The numbers have twice increased up to fourteen to fifteen hundred, but in the hot summer of Switzerland they tend to fall, deaths occurring when the temperature in the cage passes 30°C. for considerable periods. Similar figures have been obtained with the other strains.

The notes on biology repeat to a considerable extent what the author has already published. *P. A. Buxton*

LAPEYSSONIE, T. C. L. Trypanosomiase humaine. [**Human Trypanosomiasis.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1947, v. 4, No. 3, 261–73.

This is a general account, emanating from the *Centre d'Etude des Trypanosomiases Africaines*, on the subject of human trypanosomiasis, with particular reference to diagnosis and treatment under field conditions. It seems to be intended mainly as an introduction for new medical officers, and should serve sufficiently well for this purpose, though there are several misleading over-simplifications or statements which are of at least a controversial nature, as, for example, the following :—It is stated that the pathogenic agent is essentially *T. gambiense* in West and Central Africa and *T. rhodesiense* in East Africa ; it is claimed that cross-immunity tests are necessary in order to distinguish between these two species [implying the fallacious corollary that such tests can be depended upon to establish the identity of different strains of the same species] ; a possible reservoir in game and cattle is held to have been disproved for both the main forms of human trypanosomiasis.

There is little that is new in the more detailed sections on diagnosis and treatment, which evidently refer only to *gambiense* sleeping sickness. Tartar emetic has been abandoned, and atoxyl and orsanine are gradually dropping out. The view held generally by French field workers is repeated that tryparsamide is, in words quoted from VAUCEL, the least effective of trypanocides (" *le moins bon des trypanocides* "), that is, it does not destroy parasites in the lymphatico-blood system and should therefore be used *only* in second stage cases, or, if used in the first stage, it should always be preceded by atoxyl, suramin or pentamidine. Cases which do not respond to tryparsamide in the second stage are given a course of 20 injections, with an interval of 4 days between each injection, of 4 mgm. suramin and 16 mgm. tryparsamide per kilo body weight, the two compounds being administered simultaneously in the same syringe.

Measures directed against the tsetse fly are mentioned with faint enthusiasm, and in the briefest possible way in hardly more than a single page.

E. M. Lourie

BRUN-BUISSON, P., DIALLO, J., PIRIOU, L. & CAILLE, J. Premiers essais de chimio-prophylaxie de la trypanosomiase humaine en Afrique Occidentale par la pentamidine. [**The First Trials of Pentamidine as a Prophylactic Agent against Sleeping Sickness in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1947, v. 4, No. 3, 257–9.

These trials were carried out at the end of 1946 and in January 1947, in the sub-divisions of Gueckédou, French Guinea, and Sédhiou, Casamance.

In Gueckédou the trials involved 5 villages in 4 cantons where the Indices of New Cases were 1·4, 1·5, 1·9 and 3·4 per cent., respectively, and in Casamance in 2 villages in cantons where the Indices were 0·60 and 2·73 per cent., respectively. The inhabitants of these villages were divided into 2 groups, approximately equal in number and in sex- and age-distributions. The first

group received prophylactic treatment, and the second served as controls. Half the treated group received pentamidine in a single intramuscular injection of 3 mgm. per kilo, the remainder receiving a single injection of 6 mgm. per kilo (with a ceiling dose of 300 mgm.).

About 6 months later no infections were discovered among the 1,002 treated persons, while there were 19 among the 902 controls (2·1 per cent. infection rate).

This is described by the authors as the only method of protection applicable to forest regions, and the intention is to extend it in the near future to the most heavily infected cantons in the sub-divisions of Sédiou (Casamance), to Gueckédou and N'Zérékoré (Guinea) and, if possible, to selected areas of the Ivory Coast. *E. M. Lourie*

GONZALEZ VICENTE, D. Estado actual de la tripanosomiasis humana en la zona sanitaria de San Carlos (Fernando Poo). [**Present Incidence of Human Trypanosomiasis in San Carlos, Fernando Pó.**] *Med. Colonial.* Madrid. 1948, Nov. 1, v. 12, No. 5, 283–323, 9 figs., 1 map & 2 graphs. [55 refs.]

The trypanosome responsible for human sleeping sickness in San Carlos is *T. gambiense* and the vector *G. palpalis*, for all those specimens captured during the period 1943–46 were of this species. In this district this trypanosome is pathogenic also for the guineapig, the white rat, the dog and the pig, particularly the dog, and next to this the white rat. Wild animals, *e.g.* the antelope, are believed to play a very small part as reservoir hosts. The author describes the clinical symptoms in man in considerable detail, but the account contains nothing new. The Health Organization aims at a three-monthly examination of all the population. Treatment by Bayer 205 and tryparsamide combined has given the best results. In early cases Bayer 1–2 gm. for each injection (consecutively for the first 3 days and thereafter at intervals of 2 or 3 days) to a total of 8–10 gm. according to the weight of the patient; then, after an interval of 8–10 days, tryparsamide 1–2 gm. weekly to a total dosage of 20–24 gm. for an adult of 60 kgm. If the patient presents himself with nervous symptoms and there are definite changes in the cerebrospinal fluid tryparsamide is given first, then the Bayer, and a return to the tryparsamide until the fluid is normal, careful look-out being made for toxic symptoms, hepatitis, optic neuritis, etc. The reduction of cases is shown by the figures for each year from 1933 to 1945. The following has been compiled from figures given in the text and shows a reduction from 15·4 to 0·4 per cent. of the population.

Year	1933	1934	1935	1936	1937	1938	1939
Population ...	4,851	5,747	6,552	6,256	5,500	4,916	5,295
Cases	748	370	332	256	234	201	149

Year	1940	1941	1942	1943	1944	1945
Population	5,916	6,750	6,569	6,169	8,248	7,375
Cases	121	123	96	83	46	31

H. Harold Scott

PELLEGRINO, J. Distribuição e índice de infecção dos triatomideos transmissores da doença de chagas no sudoeste de Minas Gerais. [**Distribution and Infectivity Index of Triatomidae in South-west Minas Gerais.**] *Rev. Brasileira Med.* Rio de Janeiro. 1948, Aug., v. 5, No. 8, 555–66, 3 figs. (maps) & 2 graphs. English summary.

Perusal of the spot-map which accompanies this article will demonstrate more clearly than pages of description the distribution of the eight species o f

Triatomidae which are present in North-west Minas Gerais. The species are: *Panstrongylus diasi*, *P. megistus*, *P. geniculatus*, *Psammolestes coreodes*, *Triatoma infestans*, *T. sordida*, *T. rubrofasciata* and a species undetermined, and the distribution is marked in over 40 municipalities and districts. The different localities in the various municipalities and the species found in each are also presented in a table. The numbers of insects examined—males, females, larvae and nymphs—of each species and the numbers found infected by *T. cruzi* were also determined. Three species only were found to be infected, *viz.* *T. infestans*, *T. sordida* and *P. megistus*. Of 4,984 *T. infestans* examined, 1,365 (27·4 per cent.) were infected; the numbers examined were distributed as follows, the numbers found infected being in brackets: males 1,894 (620), females 1,503 (499), larvae 166 (12), nymphs 1,421 (234). Of 233 *P. megistus*, 11 were positive (4·7 per cent.); 42 (3) males, 77 (3) females, 12 (0) larvae and 102 (5) nymphs. Of 51 *T. sordida*, 12 were positive: males 16 (1), females 30 (9), no larvae, nymphs 5 (2).

The author sums up by saying that among 48 municipalities studied Triatomidae were found infected in 34. Also that whereas in other parts of the State *P. megistus* and *T. sordida* predominate, in the south-west *T. infestans* is largely, in fact almost entirely, responsible for transmission of Chagas's disease.

H. Harold Scott

MUNIZ, J. Do valor da reação de precipitina no diagnóstico das formas agudas e sub-agudas da "Doença de Chagas" (Trypanosomiasis americana). [**The Precipitin Reaction in the Diagnosis of Chagas's Disease.**] *Mem. Inst. Oswaldo Cruz.* 1947, Sept., v. 45, No. 3, 537–49, 1 fig. & 1 graph. English summary.

The precipitin reaction has, in the author's hands, proved most valuable in the diagnosis of early cases of Chagas's disease when symptoms are slight and liable to escape notice. Other methods of diagnosis take up much time, such as examination of thin and thick films of blood, cultivation, xeno-diagnosis, inoculation, etc. By the test here described a very small quantity of serum is needed, only 0·1 cc. for the test and the same for a control, and the result can be read off in a couple of minutes in some instances. So far, the author has obtained positive results in every one of 32 cases. The test is of little value in chronic cases; in more than 200 such only 18 per cent. gave positive results to the precipitin reaction; for chronic cases, therefore, other methods are better.

The material for the test is prepared as follows:—

0·5 cc. of a culture of the trypanosomes, 6–8 days old, is removed from the medium, washed in physiological saline and centrifuged. 1–1·5 cc. formamide (Kahlbaum) is added and, after shaking, the suspension is heated to 150° in a glycerin bath for 10–15 minutes. It is then cooled and 5 cc. of acid alcohol added. This is repeatedly shaken for 15–20 minutes and centrifuged. The supernatant fluid is placed in a fresh centrifuge tube and 10 cc. of pure acetone added; after rapid shaking it is put aside for 10–15 minutes and again centrifuged; the fluid is discarded and the residue placed in a vacuum chamber to get rid of the moisture. To the precipitate are added 2–3 cc. of 0·85 per cent. saline.

For the test, 0·1 cc. of the serum, clear and non-haemolysed, is placed in a small tube, 3 mm. in diameter, and the precipitinogen in the same quantity is introduced slowly down the side of the tube. In a positive case a turbid disk forms in 1–2 minutes at the junction of the fluids, but a limit of 10 minutes is interpreted as 4-plus, 10–20 minutes as 3-plus, after 30 minutes as 2-plus.

H. Harold Scott

BROWNING, C. H., CALVER, K. M. & ADAMSON, H. **The Chemotherapy of *Trypanosoma congolense* Infection with Phenanthridinium Compounds etc.** *J. Path. & Bact.* 1948, Apr., v. 60, No. 2, 336–9.

VISWANATHAN, D. K. & BHATT, H. R. **A New Species of Protozoa met with in the Salivary Glands of *A. culicifacies*, Giles, in the Course of Routine Malaria Survey—*Trypanosoma kalwanensis* Viswanathan and Bhatt (1948).** *J. National Malaria Soc.* 1948, Sept., v. 7, No. 3, 207–11, 1 fig.

"A new species of protozoa, *Trypanosoma kalwanensis*, Viswanathan and Bhatt, (1948) met with in the salivary glands of *A. culicifacies* in South India is described."

LEISHMANIASIS

LOZANO MORALES, A. Aportación al estudio de la epidemiologia del kala-azar infantil. [**Contribution to the Study of the Epidemiology of Infantile Kala Azar.**] *Rev. Sanidad e Hig. Pública.* Madrid. 1946, Aug., v. 20, No. 8, 781–4.

In the Antimalaria Institute of Cáceres, Spain, the author has seen 38 cases of infantile kala azar [one table totals 39] in the years 1941–45; one was diagnosed by the finding of leishmania in the peripheral blood, all the others by splenic or sternal puncture. The numbers in consecutive years are given as 7, 11, 9, 5 and 7 respectively. Of the 38 there were 9 under 12 months old, 23 between 1 and 3 years, 3 between 4 and 6 years, 3 more between 7 and 10 years. These last were all girls, but sex plays little if any part as regards incidence; of the total, 17 were boys, 21 were girls, and up to 6 years the figures were 17 and 18 respectively. Practically all the patients lived in or came from rural districts. *H. Harold Scott*

GOMEZ J. DE CISNEROS, J. M. Contribución al conocimiento del kala-azar en la provincia de Murcia. [**Kala Azar in the Province of Murcia, Spain.**] *Rev. Sanidad e Hig. Pública.* Madrid. 1946, Oct., v. 20, No. 10, 1012–26, 2 figs. on 1 pl. [37 refs.]

This contribution is mostly in general terms telling of the findings in smears made from the sternal marrow, of the biochemical tests of Chopra and Gupta, the formol-gel of Napier, etc. The authors then state that both the visceral and cutaneous forms of leishmaniasis occur in the Province; they have seen 30 cases in children and one in an adult of 33 years, all proved by sternal puncture, and 20 cases of oriental sore. They place no great reliance on the biochemical tests except as "pointers" calling for confirmation by examination of the sternal marrow. *H. Harold Scott*

CHAND, A., GUPTA, D. C. & CHHUTTANI, P. N. **Indigenous Kala-Azar in the Punjab.** *Indian Med. Gaz.* 1948, June, v. 83, No. 6, 291–3.

"Two cases of kala-azar have been reported—one of which got infected in Lahore. Evidence in favour of possible indigenous infection has been produced."

BUSTAMANTE, M. E. Epidemiología de la leishmaniasis en América. [**Epidemiology of Leishmaniasis in the Americas.**] *Bol. Oficina Sanitaria Panamericana.* 1948, July, v. 27, No. 7, 611–18. [18 refs.] English summary.

An article of much interest and a plea for more systematic study of leishmaniasis and interchange of information. Speaking generally, the parts of America in which leishmaniasis is found are wooded, moist and warm, except parts of Peru in which espundia is common. Visceral leishmaniasis is most frequent in the equatorial wooded parts of Brazil, Bolivia, Paraguay and the Argentine. Barretto divides the *Phlebotomus* species into: domestic, associated with man and domestic animals housed close by, as *P. argentipes* [an Indian species]; semi-domestic, living outside the dwellings but feeding on the blood of man and domestic animals, as *P. intermedius* and *P. fischeri*; and sylvan, living in forested areas and only accidentally associated with man and domestic animals, as *P. noguchii* and *P. ayrozai*. Of those named, the first three only are known to be natural vectors. [It appears that *P. fischeri* was infected experimentally with *L. braziliensis* once in 1941.]

Of 1,506 persons examined, mostly collectors of chicle gum, 11 per cent. altogether were infected; 17 per cent. were male adults, 2 per cent. women and 0·7 per cent. children. *L. braziliensis* was the infecting parasite. In 61 per cent. the ears were the sites of lesions, in 15 per cent. the arms. Wood cutters in Yucatán are much affected. A long list is given showing the nine possible vectors and the places where they have been reported and the proposal is put forward "That the Pan American Sanitary Bureau be requested to act as a center of information and coordination between the institutions and the investigators interested in the study of leishmaniasis, with the purpose in view of aiding in the formulation of a methodical joint investigation program in the Western Hemisphere". *H. Harold Scott*

SANCHIS BAYARRI, V. & MARCO AHUIR, R. Sobre el sero-diagnostico del kala-azar con el antigeno metilico tuberculoso. [**Sero-diagnosis of Kala Azar with Tuberculous Methylic Antigen.**] *Med. Colonial.* Madrid. 1948, Nov. 1, v. 12, No. 5, 279–82.

Deviation of complement with the Witebsky-Klingenstein tuberculous antigen has been recorded in cases of kala azar. Not having this antigen at hand, the authors used the methylic antigen of Boquet and Nègre. With this, 18 out of 20 patients, diagnosed by splenic puncture as suffering from kala azar, gave a strong positive, fixing 6–18 haemolytic units, the other two giving a weak positive, 1–3 units. None of a control batch gave the reaction. In the present paper eight cases are noted briefly. One patient, who had been clinically cured 5 months before, still gave a positive reaction (5 units). Subsequent examinations should show whether this patient has really been cured or is only exhibiting temporary improvement; another, recorded as cured a year before, gave a weak positive (1 unit). One other, with typical blood condition, gave a positive (3 units) although no leishmania were seen on spleen or sternal puncture. Another, suffering from acute myeloblastic aleukaemic leukaemia, in whom no leishmania were found, gave a negative to the complement fixation test. *H. Harold Scott*

TRINCÃO, C. Subsídios para o esclarecimento de alguns aspectos dos problemas do kala-azar. [**Aids to the Elucidation of certain Problems in Kala Azar.**] 127 pp., 1 fig. [Numerous refs.] 1948. Lisbon.

In his preface to this work the author disarms criticism by stating that he deals with only a few of the problems of kala azar and that the form in adults

only is considered. [But later, in the section dealing with the splenogram, details of the different cells are given in 13 cases, 3 only of which are in adults and the remainder infants.]

A few words will explain the general plan of the work which has necessitated a wide study of the literature of the subject. One new process has been reported and this will be referred to later. The author takes up various points in turn and gives in each case the development of knowledge with the passage of time and the records of research, each chapter or section ending with a fairly full bibliography. He then, in the appropriate sections, notes how his own observations agree with those stated. After an opening chapter on Portuguese literature on kala azar, sections on the pathogeny and morbid anatomy, on the blood-picture, the bone marrow and spleen smears and the different cells of the blood, marrow and spleen, the anaemia and the chemical changes in the blood, the flocculation reactions used in diagnosis, and, lastly, cultivation of *L. donovani*, are devoted to each of these in turn.

The only new matter recorded is another gel reaction which, like many discoveries of note, was of the nature of an accidental occurrence. The author was estimating the iron in the serum of two kala azar patients by Schales's method, the first stage of which consists in treating the serum with 0·3N HCl, 2 parts serum to 1 part acid for one hour. When, after this lapse of time he was about to pass on to the next stage, to his surprise he found the mixture "gelled". Repeating the process he found that this gelification occurred in 15 minutes. With the sera of other kala azar patients, one, clinically cured and giving Napier + +, did not gel with the HCl at the end of an hour, but was much more viscid than normally; another who was under treatment gave a Napier 3-plus and an HCl gel in 24 hours; three others, after their treatment had ceased, gave a Napier 1-plus, but only increased viscosity, no gel, with the HCl.

The author, therefore, standardized his results thus: Those giving a gel within an hour 2-plus, those within 24 hours 1-plus; those giving increased viscosity but not a gel ±. In a table he compares the results in 18 cases: 9 untreated, 4 under treatment, 1 inadequately treated [presumably having left off treatment as this is listed separately from the "under treatment" patients] and 4 cured, by the formaldehyde method of Napier and his own HCl method. One under treatment, one untreated, and one clinically cured were negative to both; one untreated was negative with HCl but 2-plus with formol, but ± with HCl. In general, the others all showed a reaction less marked than with Napier's method. The author concludes by saying, as regards specificity, that, having carried out Schales's method of estimating Fe in the serum in patients suffering from various diseases, he has observed 2-plus only in cases of multiple myeloma (in which the formol gel gives 3-plus); otherwise "having made thousands of serum-iron estimations by this method . . . up to the present we have never observed results similar to those in kala azar. The reaction we note as ± is not so strictly specific; we have observed it in cases of hepatic cirrhosis."

H. Harold Scott

PREVITERA, A. & BONGIARDO, A. Nuovi dati sulla leishmaniosi viscerale canina a Catania. [**New Findings regarding Visceral Leishmaniasis in Dogs in Catania.**] *Riv. Italiana d'Igiene.* 1948, July–Aug., v. 8, Nos. 7/8, 312–17. [20 refs.]

The English summary appended to the paper is as follows:—

"After having given some statistics about internal Leishmaniosis of dogs in the Mediterranean basin, the authors expose the results of their researches.

"In 82 rambler dogs captured in Catania in the period from June 1945 till June 1946 with a microscopic research in the spleen, they have observed the presence of Leishmania in 6 cases, that is a percentage of 7·1 per cent.

"Such a percentage corresponds to about the same percentage observed in the same town in 1933."

HSU, Tze-huei & HO, E. A. **Canine Leishmaniasis in Honan.** *Chinese Med. J.* Shanghai. 1948, June, v. 66, No. 6, 324.

"A dog naturally infected with visceral leishmaniasis is discovered in the same household with a kala-azar patient in Hsuchang, Honan."

FEVERS OF THE TYPHUS GROUP

BARNES, A. C. *Proteus OX19* **Agglutination in Pregnancy.** *Amer. J. Clin. Path.* 1948, Aug., v. 18, No. 8, 635–6.

GRATCH [this *Bulletin*, 1944, v. 41, 197] reported that *Proteus OX 19* was agglutinated by the sera of all of 505 pregnant women examined. This finding was of interest in relation to the interpretation of the Weil-Felix test and as a possible basis for a test for pregnancy. The present paper gives details of results obtained with the sera of 402 women, of whom 207 were pregnant. A commercial *OX 19* antigen was used, tests being made by a slide technique. A higher percentage of the sera from pregnant women (73·9 per cent.) gave a positive result than those from non-pregnant women (41·6 per cent.) at a titre of 1/20 or over. It is considered that the finding is not sufficiently constant to serve as an aid to pregnancy diagnosis, but that it may be important in relation to the diagnosis of rickettsial disease.

[The detailed figures now recorded are in close accord with those of NELSON and CRUICKSHANK (this *Bulletin*, 1945, v. 42, 363) who found agglutinins to *Proteus OX 19* with greater frequency in the sera of pregnant women than in normal sera, but not with such constancy or to such high titres as had been reported by GRATCH.] *J. C. Cruickshank*

LODENKÄMPER, H. Beitrag zu Erfahrungen mit der Weil-Felix-Reaktion. [**Studies of the Weil-Felix Reaction.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Nov. 18, v. 104, No. 1, 1–18. [27 refs.]

The author gives his own experience of the Weil-Felix test and a critical review of the recent German literature of the subject.

An interesting comparison is made of the titres observed in a series of tests carried out simultaneously on sera of patients suffering from fevers other than typhus with two strains of *Proteus OX19* supplied to the German Field Laboratories during the Second World War. The findings are shown in the table:—

Titres	0	1–50	1–100	1–200	1–400	Total
Strain "Do" ...	464	71	40	2	0	577
Strain "Ko" ...	323	115	99	36	4	577

In tests carried out on typhus patients the titres were usually so high that practical difficulties rarely arose even when the titres observed were widely different.

Typhus patients who had been vaccinated against the disease usually reacted at low titres or not at all, but among non-vaccinated patients the reaction was regarded as diagnostic in almost 100 per cent. of the cases.

Extraordinarily high titres were sometimes observed such as one of 1–1,630,400 in a serum whose reading was made after 24 hours, and one in which the titre reached 1–409,600 after two hours.

The author, like most other observers of the reaction, makes little reference to the diagnostic significance of the low, but rising, titres observed during the early stages of the illness. *John W. D. Megaw*

TRIFFTERER, Theresia. Zusammenhang zwischen der Weil-Felixschen Reaktion und der Präzipitation des O-Antigens des Proteusbazillus X 19. [**The Correlation between the Weil-Felix Reaction and the Precipitation of the O-Antigen of** *Proteus X19.*] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Nov. 18, v. 104, No. 1, 41–50. [66 refs.]

The first part of this paper consists of a very useful documented review of the literature dealing with the antigenic structure of *Proteus X19* and other organisms. The bibliography contains 65 references.

The second part contains the results of a series of comparative tests in which typhus and other sera were submitted to the Weil-Felix reaction and to a precipitation reaction in which the antigen was a solution of a "glucolipoid" extracted by BOIVIN from *Proteus X19*. The name glucolipoid was given by BOIVIN *et al.* [see *Bulletin of Hygiene*, 1936, v. 11, 589; 1938, v. 13, 842; 1939, v. 14, 344] to water-soluble substances contained in various Gram-negative bacteria, including *Proteus X* and consisting of the polysaccharide specific for each organism combined with phosphates. The glucolipoids are regarded as the O-antigens of the organisms.

In conformity with the findings of CIUCA *et al.* [*ibid*, 1938, v. 13, 756] the author found that a fairly uniform correlation existed between the Weil-Felix titres of the sera and the maximum dilution of the glucolipoid which produced precipitation when added to the sera.

Sera with Weil-Felix titres of less than 1–200 usually gave negative reactions with the precipitation test, even with the strongest solution, which was 1–2,500; titres of 1–400 corresponded roughly with precipitation reactions with solutions of 1–25,000, and titres of 1–800 with reactions with solutions of 1–50,000.

The glucolipoid solution was highly toxic to mice when given intravenously; when previously mixed with immune sera having high Weil-Felix titres the toxic action was inhibited. *John W. D. Megaw*

MORONES, S. Tratamiento del tabardillo con P.A.B.A. [**Treatment of Tabardillo with** *Para*-**aminobenzoic Acid.**] *Gac. Méd. de México.* 1948. Apr. 30, v. 78, Nos. 1/2, 73–7.

In a series of controlled trials the author found that *para*-aminobenzoic acid given in the usual doses caused no significant benefit to patients, suffering from tabardillo, whose treatment was started after the appearance of the rash. The average day of the disease on which the first dose was given is stated to have been the eighth. [No definition is given of the name tabardillo, presumably the disease was louse-borne typhus.] The failure of the drug when given late in the course of the illness is not surprising, YEOMANS *et al.* had a similar experience [see this *Bulletin*, 1945, v. 42, 201]. *John W. D. Megaw*

PAYNE, E. H., SHARP, E. A. & KNAUDT, J. A. **Treatment of Epidemic Typhus with Chloromycetin.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1948, Sept., v. 42, No. 2, 163–70, 1 plan & 2 figs. on 1 pl.

The authors have obtained remarkably successful results in the treatment of 22 cases of louse-borne typhus with the new antibiotic, chloromycetin [see this *Bulletin*, 1948, v. 45, 779].

The cases were seen at Puerto Acosta in the province of Camacho, Bolivia. Four of the patients "presented signs and symptoms of probable death," and five others "gave evidence of certain death," yet all made a rapid recovery. The day of the disease on which treatment was started is mentioned in only three of the cases, in which it ranged from the 6th to the 12th day.

In nine of the cases the temperature became normal within 24 hours, and in none of the others did the fever last for more than 54 hours after the first dose was given. The pulse responded with equal promptitude, and the patients usually "entered convalescence" within three days.

The dosage adopted towards the end of the study was 1·5 gm. given by the mouth once daily for two or three days; this system gave as good results as were obtained in earlier cases in which larger doses were given over longer periods. Oral treatment was as effective as intravenous, but the response was delayed by eight to twelve hours, probably because the tablets used were excessively compressed and took several hours to disintegrate.

Intravenous treatment was by a solution containing 1·0 gm. in each phial of 10 cc., the solvent being propylene glycol. The usual dose was 0·2 gm., given very slowly, and four or five such doses were given daily, usually in addition to oral treatment. The total amount of chloromycetin given to adult patients was usually 4·0 to 5·0 gm. during the early part of the study; one patient, exceptionally, received 8·8 gm.

No toxic reactions were observed; on the contrary the authors state that "the rapid beneficial effect on the heart action suggests that chloromycetin has the additional virtue of being a myocardial tonic".

Among 50 untreated cases occurring in the same epidemic, there were 14 deaths, but although no details are given to show that these cases were strictly comparable the evidence produced by the authors amounts almost to proof of the great efficacy of the drug. *John W. D. Megaw*

MARIANI, G. Le piu' recenti osservazioni in Italia sull' impiego del vaccino antidermotifico. [**The Most Recent Observations in Italy on the Use of Typhus Vaccine.**] *Ann. d'Igiene.* 1948, Jan.–Feb., v. 58, No. 1, 43–5.

GRASSI-BERTAZZI, C. Reperto di elementi rickettsioidi negli endoteli polmonari di ratti portatori di virus murino dermotifoso. [**Presence of Rickettsial Elements in the Lungs of Rats Infected with Murine Typhus.**] *Acta Med. Italica.* 1948, Sept., v. 3, No. 9, 228–31, 4 figs. [20 refs.]

The English summary appended to the paper is as follows:—

"The author, during systematic research in 17 rats of the town of Catania, could demonstrate the existence of the virus of typhus, through inoculation in guinea pigs, notwithstanding the actual absence of signs of disease. In 5 of these 6 cases he could put in evidence, in the lungs, a high number of rickettsioidal elements."

POMALES LEBRON, A., ARBONA, G., MORALES OTTERO, P. & KOPPISCH, E. Les réactions de fixation du complément et de Weil-Felix dans l'étude du typhus des rats sauvages à San-Juan et Santurce (Puerto-Rico). [**The Complement-Fixation and Weil-Felix Reactions in the Study of Typhus among Wild Rats in San-Juan and Santurce (Porto Rico).**] *Arch. Inst. Pasteur de la Martinique.* 1948, Jan., v. 1, No. 1, 21–6.

Between 7 December, 1944 and 22 June, 1945, the sera of 413 wild rats caught in San-Juan and Santurce were tested by the complement-fixation reaction (epidemic-typhus antigen), and sera of 251 of these rats were tested also by the Weil-Felix reaction. With the former test, 54 per cent. of the rats gave positive reactions at unstated titres; with the latter test 24 per cent. reacted at titres ranging from 1–25 to 1–1,600.

During the three months, January to March 1945, there were 26 cases of murine typhus in the two towns, whose combined population was 208,038; and during the three months, April to June of the same year, there were 71 cases, but the percentage of positive fixation reactions among rats was almost the same in the two periods. Among full-grown rats (100–200 gm.) the percentage of fixation reactions was 70; among the small young rats (25–50 gm.) the percentage was 42.

Among the 251 rats subjected to both tests, 139 gave positive fixation reactions, and 42 of these reacted also with the Weil-Felix test; of the 112 rats that did not react with the fixation test, 19 gave positive Weil-Felix reactions.

John W. D. Megaw

COCKINGS, K. L. **Successful Methods of trapping** *Trombicula* **(Acarina) with Notes on rearing** *T. deliensis*, **Walch.** *Bull. Entom. Res.* 1948, Aug., v. 39, Pt. 2, 281–96, 5 figs.

Some methods of trapping Trombiculid mites are described which are based on their reactions to light and warmth and their tendency to climb upward. The details of construction are illustrated by drawings.

A field mite-trap for collecting unengorged larvae consists of a Petri dish containing a filter paper cone which is placed on the ground and covered with a black metal tray three feet square and three inches high. This cover has a two-inch circular hole in the centre which should be placed immediately above the paper cone. Specially shaped wooden battens screwed to the cover give it a rise from sides to middle of half an inch. A glass specimen tube 1½ inches in diameter is fixed, by means of a grooved rubber ring, half way inside a two-inch diameter tube. These tubes are put mouths downwards into the hole in the cover in such a way that the inner tube rests on the paper cone; this is the only source of light beneath the cover. Larval mites within the square yard enclosed by the cover go towards the light, climb the Petri dish and the cone and are trapped in either one tube or the other. The trap is left in position for four and a half to five hours.

Another method for collecting larvae is by using bait animals. The guinea-pig and the golden hamster were found to be the most suitable animals. Wire cages, each containing two animals, are placed on the earth to form a circle leaving a space equal to the width of one cage between the cages. The cages are moved one space every hour until a complete circuit has been made. Before exposure the animals should be clipped short around the genitals, perineum and ears to facilitate rapid examination for larval mites.

A laboratory light trap was originally used in Assam for collecting replete larvae of *Trombicula deliensis* from live rats. It was also used in England for recovering engorged larvae of *T. autumnalis* from the bait animals. The light trap consists of a square box big enough to hold two guineapigs; one end of

the box is closed by a wire mesh door ; fixed at the other end is a black paper funnel twelve inches long, tapering to an aperture one inch in diameter. A filter paper tongue is attached to the aperture and leads to a Petri dish containing water. When in use the box is raised at one end so that the larvae walk up a slight gradient towards the opening in the funnel, opposite which is a 25- or 40-watt lamp, nine inches away. Larvae have appeared on the filter paper tongue within three minutes of the funnel having been placed in position. For some purposes a specimen tube can be substituted for the filter paper tongue.

" Flagging " is a method of collecting larvae in the field, by trailing a coarse cloth over the ground, but it is considered unsuitable for survey work except in the absence of a field mite trap. This method probably collects only a small proportion of the larvae and the task of removing them from the cloth is very tedious, though the light trap could be used for this purpose.

Flotation is employed for collecting adult mites from soil. A soil sample is sprinkled into a sink containing warm water three inches deep. The soil is stirred twice for a minute and the adult mites are then picked off the water surface. After five minutes no more adults appear. This method is not suitable for recovering large numbers of nymphs as they are more fragile than the adults and more easily wetted. Field observations on the movements of adult *Trombicula autumnalis* in moist soil showed that they rise towards the surface when the air temperature is high and go deeper when the temperature is low. They also go deeper when the soil is dry and rise after rain.

For the rearing of nymphs for systematic purposes, engorged larvae are put into a cloth-bottomed metal cell ½ to ¾ inch in diameter and an eighth of an inch deep ; a coverslip is sealed with wax on to the top of the cell. The cell is then kept in a moist atmosphere in a Petri dish. When larvae show signs of undergoing metamorphosis the cell is lightly flooded, the nymphophanes which float off the cloth are picked out and placed singly in other cells from which the nymphs and their larval pelts are obtained and mounted on slides for microscopical examination in polyvinyl alcohol. *H. S. Leeson*

WILLCOX, P. H. A. **Mite Typhus Fever in Assam and Burma, 1944–1946.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1948, Sept., v. 42, No. 2, 171–89. [34 refs.]

Of the 493 cases studied, all but 17 occurred at Imphal and Palel during the six months, July to December, 1944, so that to all intents and purposes the description of the clinical findings refers to this outbreak.

The case fatality rate was 8·3 per cent. ; this was not high, considering that the patients had been greatly debilitated by wartime hardships in highly malarious areas and had usually been admitted to hospital after a trying journey lasting two days.

The author was struck by the close resemblance of the clinical and pathological features to those of louse-borne typhus.

Headache occurred in every case, there were mental changes in 95 per cent. of the cases; enlarged glands in 90 per cent., chest signs in 75 per cent., and conjunctival injection in 68 per cent. A rash was seen in 77 per cent. of the European, in 31 per cent. of the Indian, and in 27 per cent. of the East-African, patients. An eschar was seen in 20 per cent. of the cases. The average duration of the fever was 17·2 days.

Numerous references are made to observations on wartime mite typhus by other authors ; one of these is misleading—it seems to suggest that the outbreak at Ranchi in 1943 was mite-borne, whereas it almost certainly was tick-borne and is so described by BOWES [see this *Bulletin*, 1948, v. 45, 63].

John W. D. Megaw

VALLEJO-FREIRE, A. Febre maculosa no México. Cultivo de Riquétsias. [**Spotted Fever in Mexico. Culture of Rickettsia.**] *Mem. Inst. Butantan.* 1947, v. 20, 1–11, 6 figs. [28 refs.] English summary.

Both versions of the title of this paper are copied from the index to the journal in which it appears; the spotted fever referred to is the form of tick-borne typhus indistinguishable from Rocky Mountain spotted fever.

A detailed description illustrated by six photographs is given of the cultivation of the rickettsiae by Cox's method. The technique and apparatus employed are clearly described; an Oswald oxy-acetylene blow-pipe (type W-29, bico No. 2) is used for making apertures in the shell for the aseptic introduction of the infecting material into the yolk sac, and for cutting off a cap of the shell preparatory to the extraction of the incubated sac.

An interesting point is that the author has never been able to detect the presence of rickettsiae inside the nuclei of the cells in stained preparations; though the intranuclear localization of the organisms has been regarded as the chief point of difference between *Dermacentroxenus* [*Rickettsia*] *rickettsi* and the rickettsiae of the other fevers of the typhus group.

The original inoculum from which the cultures were prepared was obtained from blood, brain substance, and tunica-vaginalis scrapings, of guineapigs infected with a strain of rickettsiae isolated by BUSTAMANTE and VARELA from a patient in Mexico. The number of rickettsiae seen in stained smears of vaginalis scrapings became much greater after the fifth passage "than that seen in other spotted fever strains." *John W. D. Megaw*

VALLEJO-FREIRE, A. Transmissão do virus da febre maculosa mexicana por *Amblyomma striatum* Koch, 1844. [**Transmission of Rickettsiae of Mexican Spotted Fever by *Amblyomma striatum* Koch, 1844.**] *Mem. Inst. Butantan.* 1947, v. 20, 107–12. English summary (5 lines).

The author has succeeded on one occasion in bringing about the experimental transmission of Mexican spotted fever rickettsiae from guineapig to guineapig by the bite of *Amblyomma striatum*. He has also demonstrated the presence of infection in the eggs of an experimentally infected specimen of the same species of tick.

The strain employed was the one used in the experiments described in the preceding paper. *John W. D. Megaw*

LOCKE, R. F. & HELVIG, R. J. **The Veterinary Public Health Significance of Q Fever.** *J. Amer. Vet. Med. Ass.* 1948, Nov., v. 113, No. 860, 454–7. [14 refs.]

GUTSCHER, V. & NUFER, K. Ueber eine Queenslandfever-Endemie in Bremgarten (Kt. Aargau). [**An Outbreak of Q Fever in Bremgarten (Aargau Canton, Switzerland).**] *Schweiz. med. Woch.* 1948, Oct. 30, v. 78, No. 43, 1064–6, 2 figs.

A retrospective diagnosis of Q fever was made in the case of a worker in a furniture factory who had been attacked on 6th April, 1948, by an illness diagnosed as bronchopneumonia. His complement-fixation reaction for Q fever was positive at a titre of 1–640. On enquiry it was found that 59 of the 107 persons employed at the factory had been attacked by an influenza-like illness between 14th March and 23rd April. Most of the 38 former patients who were investigated gave histories of illness suggestive of Q fever and positive complement-fixation reactions. None of the unaffected workers who were examined gave positive reactions.

An epidemiological investigation failed to reveal the source of the infection. *John W. D. Megaw*

PARKER, R. R., BELL, E. J. & LACKMAN, D. B. **Experimental Studies of Q Fever in Cattle. I. Observations on Four Heifers and Two Milk Cows.** *Amer. J. Hyg.* 1948, Sept., v. 48, No. 2, 191–206.

The purpose of these studies was to obtain evidence with regard to the mode of transmission of Q fever. Two lactating cows were successfully infected. One cow was inoculated with a yolk-sac suspension of *Coxiella* [*Rickettsia*] *burneti* which was introduced into three of the quarters of the udder; one dose was given *via* the milk duct, another was injected into the body of the mammary gland of another quarter, and the third was injected subcutaneously over the gland of one of the two remaining quarters. Milk from the quarter inoculated *via* the milk duct was repeatedly found infected up to the 17th day, and milk from the quarter inoculated *via* the body of the gland remained infected up to the 40th day. Milk from the other two quarters was not infected.

Blood of this cow gave a positive complement-fixation reaction from the 5th day and the titre rose to 1–256 by the 7th day. The cow showed no signs of illness at any time.

The other cow was inoculated *via* the milk duct of one quarter with a yolk-sac suspension containing five million infectious doses for a guineapig; the milk of the inoculated quarter remained infected up to the 40th day; milk from the adjacent two quarters was not infected. The cow showed no signs of illness, and repeated inoculation of guineapigs with her nasal washings, urine and faeces gave negative results.

Four heifers aged seven to ten months were inoculated with infected material in the following ways: (1) spleen suspension of an infected guineapig was sprayed intranasally into one; (2) infected yolk-sac suspension was injected intravenously into another; (3) bran contaminated with infected yolk-sac material was given orally to the third animal; and (4) a suspension of infected guineapig spleen was introduced into the vagina of the fourth. Repeated inoculation of guineapigs with blood, nasal washings, urine, and faeces gave negative results, except that the urine of the animal inoculated through the vagina was infective on the 5th and 9th days, probably by contact with the original infected material. None of the heifers gave a positive complement-fixation reaction at any time.

Full details are given of the technique employed by the authors. The findings are regarded as suggesting that cows may become infected through the milk ducts, either during milking or through contact with bedding contaminated by infected urine. The need for further study of the problem is emphasized. *John W. D. Megaw*

BARTONELLOSIS

RICKETTS, W. E. **Bartonella Bacilliformis Anemia (Oroya Fever). A Study of Thirty Cases.** *Blood.* 1948, Sept., v. 3, No. 9, 1025–49, 12 figs. [50 refs.]

[A report of a careful study with results of much informative value.] The author discusses the findings in 30 cases of anaemia with the presence of *Bartonella bacilliformis* in the erythrocytes. Details of repeated examinations of the blood of uncomplicated cases of bartonella anaemia are given in a table and records of six patients, illustrating different accompanying conditions; in one, a reduction of red cells to nearly half a million per cmm., with intensive regeneration and exceptional macrocytosis; in another, early death on the 10th day with similar reduction of red cells, nearly all parasitized by *Bartonella*; a third died from a complicating thrombocytopenic purpura; a fourth from

the same, although the parasites were disappearing from the corpuscles. This stage, when the organism is disappearing, has been called the " critical stage " ; the bartonellae change from the bacillary to the coccoid form, the parasitized cells are fewer, as are the numbers per cell; the erythrocyte count goes up, reticulocytes increase, macrocytes decrease, there is lymphocytosis with reappearance of monocytes and eosinophiles and a shift of the polymorphonuclear series to the right. In short, convalescence seems to be setting in, but this may be deceptive ; complications arise and a fatal issue may occur, due to intercurrent *Salmonella* infection from the intestinal tract, with a generally lowered body resistance.

To sum up : Bartonella anaemia occurs in the invasive stage of the disease, and not during the course of it ; the later forms which are seen in the pre-eruptive and eruptive stages are different, morphologically and clinically, and are due to haemorrhages, intercurrent infections, thrombocytopenic purpura and other causes. The anaemia is macrocytic in type, often hypochromic, with young granulocytes, reticulocytosis even to 50 per cent., erythroblasts and polychromatophilia—in short, marked signs of blood formation. The polymorphonuclears show a shift to the left, with myeloblasts, myelocytes and metamyelocytes present.

The prognosis is very grave ; of the 30 cases observed, 22 ended fatally. Fifteen suffered with intercurrent infection and 11 of these died, as did nine out of 15 who had no such infections. As regards treatment, some authorities have maintained that blood transfusion is dangerous because of the possible invasion of the new cells by the bartonella, but in practice patients may be greatly benefited by such treatment. Incidentally [though it is probably too late for remedy now] the author states that Oroya Fever is not an appropriate name for Bartonellosis or Carrión's disease, as " bartonella infection does not occur in the Peruvian city of Oroya." *H. Harold Scott*

YELLOW FEVER

LIEGEOIS, P., ROUSSEAU, E. & COURTOIS, C. Complément d'enquête sur la distribution de l'immunité antiamarile naturelle chez les indigènes du Congo belge. [**Final Results of the Investigation of the Distribution of Natural Immunity to Yellow Fever in the Native Population of the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1948, June 30, v. 28, No. 2, 247–67, 1 map.

The medical laboratory at Stanleyville has been carrying out studies of immunity to yellow fever in the Belgian Congo since 1938, using the mouse protection test of Sawyer and Lloyd for estimating neutralizing antibodies in serum.

Most of the results obtained up to the end of 1941, chiefly in Province Orientale (including Stanleyville), have already been published [see this *Bulletin*, 1944, v. 41, 1025] and the essentials are included in the present summary.

Tests have been carried out on serum from 3,399 infants and 3,688 adults from 136 localities in 81 territories, 17 districts and residencies.

The regions from which only negative results were obtained are the regions at high altitudes. The results from the vast equatorial forest region indicate that the disease is of low endemicity there. The highest rates have been obtained in some parts of the lower Congo and in the north part of Ubangi and

Uele. These areas are savannah interspersed in the forest galleries. However, similar high rates have not been found in similar savannah in the southern part of the Belgian Congo. There was no evidence of a recent epidemic in any region.

There were only 2 areas in which the disease had been present as recently as 1939, one 1938 and the rest in 1936 or previously, mostly before 1930.

In addition, serum from 2 of 3 chimpanzees and 1 of 3 cercopithecus monkeys had neutralizing antibodies for yellow fever virus. Serum from 3 cynocephalus monkeys, 1 cercocebus and 1 cebus were negative. *F. O. MacCallum*

See also p. 172, HADDOW, **The Mosquitoes of Bwamba County, Uganda. VI. Mosquito Breeding in Plant Axils.**

PERLOWAGORA, A. & HUGHES, T. P. **The Complement Fixation Test in Yellow Fever Epidemiology. II. The Development and Loss of Complement-Fixing Antibodies in Marmosets** (*Callithrix penicillata, C. jacchus* **and** *Leontocebus chrysomelas*). *J. Immunology.* 1948, Sept., v. 60, No. 1, 67–75. [11 refs.]

It is known that complement-fixing antibodies for viruses do not remain in the serum for long periods after convalescence. This has been shown to be true in yellow fever infection in man and rhesus monkeys. It has been shown by virus isolation and serum neutralization tests in recent years that certain species of marmosets are infected with yellow fever virus in the wild state in parts of South America, where the disease is endemic. It is difficult, however, to tell the date of the infection by the presence of neutralizing antibodies in a single sample of serum. The authors have found that complement-fixing antibodies appear between the 15th and 30th day of the infection in marmosets, reach a maximum titre in 4 to 5 weeks and then gradually disappear. One-third of the marmosets had lost their complement-fixing antibody by the third month and all but one of 26 survivors were negative by the ninth month. This test, combined with the neutralization test of the animals' serum, can thus be used to determine the approximate time of infection with yellow fever virus in marmosets in nature. *F. O. MacCallum*

DENGUE AND ALLIED FEVERS

YAOI, H. & ARAKAWA, S. **Studies on Dengue (Resumé).** *Japanese Med. J.* 1948, Feb., v. 1, No. 1, 4–12. [12 refs.]

This paper is a summary of 12 articles by the same authors, published during the years 1943–1946. Animal experiments were carried out on much the same lines as those described in the paper below.

By using very young mice for the earlier inoculations the virus became adapted to intracerebral transmission through adult mice, young guineapigs, rabbits, rats, and monkeys. In the earliest passages through very young mice the incubation period ranged from "several days" to as long as 17 or even 25 days, but after repeated passages a *virus fixe* was obtained which killed adult mice in four or five days.

The virus was cultivated in tissue cultures and in chick embryos, and although the lesions of the chorioallantoic membranes described by SHORTT were "hardly observed" the latter method was found specially suitable for the maintenance of the virus in a virulent form.

A potent immune serum was obtained by repeated inoculation of rabbits, goats, and a horse, with infected mouse-brain substance. Immune serum of a horse when injected into dengue patients early in the illness was thought to cause a diminution in the pains and other symptoms, but it had no effect on the temperature curve.

Attempts were made in eight cases to infect human volunteers by intradermal injections of infected mouse heart-blood; in one case an "almost typical," and in another a fully typical, attack was produced; in the remaining six cases atypical mild dengue occurred and it was noticed that the latter resulted from the use of virus fully adapted to mice whereas the typical attacks were caused by virus incompletely adapted. Suspensions of the brains of young guineapigs and monkeys infected with mouse-adapted virus were used as vaccines, but the information supplied with regard to the efficacy of these does not appear to be conclusive. *John W. D. Megaw*

ISHII, N. **Studies on Dengue Fever I. Studies on Dengue Virus and Immunity (1).** *Japanese Med. J.* 1948, Apr., v. 1, No. 2, 160–75, 2 charts.

The extensive studies described by the author were carried out during the three years, 1942–1944. The paper contains numerous references to the work of other observers.

Transmission of the dengue virus through the eyes of rabbits and the brains of mice was effected in 1942; the source of the virus was the blood of patients in Nagasaki.

Serum of a volunteer experimentally infected by rabbit-eye virus, and of another infected by mouse-brain virus, when inoculated intracerebrally caused the death of mice on the third or fourth day, when injected intra- or subcutaneously the sera caused death, on the third to the sixth day, of three out of five guineapigs inoculated by either of the above routes.

Attempts to transmit the virus through embryo chicks were not altogether successful; the changes produced in the chorioallantoic membrane were slight and became even less pronounced after successive passages.

White rats were found susceptible to the mouse virus, which was maintained in them for 50 passages by the intracerebral route, and for an unstated number of passages by subcutaneous inoculation.

The mouse-brain and rabbit-eye strains were maintained for about 300 passages, over a period of three years, through the brains of mice. The virulence at first increased, reaching its highest point by the fifth passage; it then declined to some degree but at about the 20th passage it became stable. Sera from the infected mice, at various passages up to the 227th, when injected into 14 volunteers by the intracutaneous or subcutaneous routes caused attacks indistinguishable from dengue in 13 cases. Sera of two of the volunteers, taken on the first day of the fever, caused typical signs in mice after intracerebral inoculation; the serum of one volunteer, taken on the third day, and of two others, taken on the 12th day, did not produce signs of infection in mice.

By experiments in which suspensions of various tissues of infected mice were inoculated into the brains of other mice it was found that the blood was richer in virus than the spleen, liver, and kidney; and that the brain suspensions were less virulent than any of the above. The virus therefore appeared to be pantropic rather than neurotropic.

The virus was killed by exposure to a temperature of 55°C. for 50 minutes, and by exposure to 60°C. for five minutes. Infected blood of patients, when kept at a temperature of 3°–4°C. remained virulent for 35 days, but not for 42 days; when kept at −8°C. virulence was lost before the 28th day, and

when kept at 10°–15°C. virulence was lost before the 14th day. Suspensions when dried and kept at 6°–8°C. in the ice chest were found infective 467 days later. *John W. D. Megaw*

RABIES

PIRINGER, W. Tollwut durch Schleimhautinfektion. [**Rabies Infection through a Mucous Membrane.**] Reprinted from *Schweiz. Ztschr. f. Path. u. Bakt.* 1945, v. 8, Nos. 3/4, 245–51.

The author describes an experiment in which an attempt was made to infect 90 guineapigs by means of a single application of street virus to mucous membranes in different parts of the body. Of the 90 animals only one—infected through the buccal mucosa—developed rabies. The conclusion is reached that, after a single contact of street virus with mucous membrane, rabies infection may be contracted, irrespective of the site of exposure, but that, as in the case of dogs under natural conditions, such occurrence is extremely rare.

[REMLINGER (*La Rage*, 1947, pp. 41–42), in a study of the controversial question as to whether rabies virus can be absorbed by healthy mucous membranes, expressed the view that only through the nasal mucosa can such absorption take place—a view shared by many other workers. An explanation given by GAUCHER to account for this selectivity is that mucosae covered with pavement epithelium do not absorb liquids, while those provided with cylindrical epithelium can be penetrated by infective fluids.] *G. Stuart*

TANAMAL, S. J. W. Microscopische diagnostiek van rabies. [**Microscopic Diagnosis of Rabies.**] *Nederl. Tijdschr. v. Geneesk.* 1948, Nov. 27, v. 92 (iv), No. 48, 3949–50.

" The author recommends a formula for staining the NEGRI bodies in smears of AMMON's horn.

" Standard solution: Diamond [basic] fuchsin 1 g; Azure II 1·5 g; Neutral spiritus fortior 100 cm³.

" Fresh staining solution: Alkaline aqua dest. 10 cm³; Standard solution ½ cm³ Stain for half a minute."

DE BOER, E. Filariasis bij honden en de differentieel diagnose van rabies. [**Filariasis in Dogs and the Differential Diagnosis of Rabies.**] *Nederl.-Indische Bladen v. Diergeneesk.* 1948, Sept., v. 55, Nos. 3/4, 175–7.

The English summary appended to the paper is as follows :—

" Routine-examination of the brain tissue of a dog, killed after attacking a goat and a child, did not give any indication with regard to rabies. The finding of many microfilariae (in all probability of the species *Dirofilaria immitis*), however, pointed out that filariasis clinically may lead to a mistaken suspicion of rabies."

TUNÇMAN, Z. M. Isirilmadan husule gelmiş nadir bir insan kuduzu vak'asi. [**A Rare Case of Rabies without a Bite.**] *Türk Tip Cemiyeti Mecmuasi.* 1946, Feb., v. 12, No. 2. [In Turkish 60–64. English summary 6–7.]

A villager from Geyve killed a calf because it had all the signs of rabies. He developed rabies three months later. It is considered that he was infected through scratches on the right hand. *H. J. O'D. Burke-Gaffney*

CHEN-JEN, C. & ZIA, S. H. **Study of Fixed Rabies Virus propagated in the Brain of Guinea Pig Fetus.** *J. Immunology.* 1948, Sept., v. 60, No. 1, 17–21. [16 refs.]

In view of the equivocal results obtained by previous workers in cultivating rabies virus by the conventional methods, the present authors attempted to propagate a fixed rabies virus in the developing foetal brain of the guineapig *in utero*. In this connexion they describe the successful outcome of their experimental work and show not only that the virulence of the virus remained unchanged (10^{-7} to 10^{-8}), even after 16 passages, but that the culture virus vaccine possessed an immunizing potency comparable with that of an adult brain vaccine. Moreover, there is an advantage in using foetal brain for vaccine instead of adult brain—an advantage corroborated by the work of KABAT, WOLF and BEZER [see *Bulletin of Hygiene*, 1947, v. 22, 313], who state that foetal rabbit brain failed to produce any lesion in rhesus monkeys, while adult brain, when given in large doses, almost invariably produced lesions. Although the amount of material available in the guineapig foetus is necessarily small, this difficulty might be overcome by employing, for vaccine production, the foetuses of larger mammals such as sheep or goats.

It is noteworthy that the authors, who found phenol-preserved vaccine, whether made with foetal of adult tissue, to be much less protective than formolized vaccine, are now engaged on a detailed comparative study of the effect of phenol and formalin on the antigenicity of rabies tissue vaccine.

G. Stuart

FREUND, J., LIPTON, M. M. & PISANI, T. M. **Immune Response to Rabies Vaccine in Water-in-Oil Emulsion.** *Proc. Soc. Exper. Biol. & Med.* 1948, July-Aug., v. 68, No. 3, 609–10.

"The incorporation of inactivated rabies vaccine into water-in-oil emulsion enhanced the antigenic property of the vaccine as judged by the formation of neutralizing antibodies. Allergic encephalitis did not occur unless mycobacteria were added to the emulsion."

BÉQUIGNON, J. R. & VIALAT, C. Les vaccinations antirabiques à l'Institut Pasteur en 1947. [**Antirabic Vaccination at the Pasteur Institute in 1947.**] *Ann. Inst. Pasteur.* 1948, Aug., v. 75, No. 2, 163–7.

A statistical summary.

LUSSICH, J. J. Organización de la lucha contra la rabia en la República Oriental del Uruguay. [**Organization of Control Measures against Rabies in Uruguay.**] *Bol. Oficina Sanitaria Panamericana.* 1948, July, v. 27, No. 7, 624–6.

In Montevideo during the period 1927–1936, incidence of canine rabies continued on an uncomfortably high level,with the result that annually more than 1,000 bitten persons had to submit to anti-rabies vaccination. In 1934, the Sanitary Authorities, realizing that the steps taken up to that time had failed to reduce rabies incidence among dogs, introduced the following measures of control: (*a*) isolation and observation of animals suspected of rabies; (*b*) collection of dogs found wandering in the streets, and destruction of those not claimed by their owners; (*c*) organization of a service to identify animals, which had run risk of infection by rabid dogs; (*d*) compulsory notification of all cases of rabies or of suspected rabies among animals, and destruction of all such animals; and (*e*) compulsory vaccination of all dogs collected off the streets and returned to their owners.

Statistics show that, between 1st October, 1934—the date on which the new measures came into force—and 31st December, 1947, of 136,008 dogs collected on the public highways, 120,946 were destroyed and 15,062 restored to their owners after having been given a single injection of UMENO and DOI's phenolized vaccine. It is noteworthy that not a single case of rabies developed among the 15,062 dogs vaccinated. That the control measures introduced in 1934 achieved the desired result, is evidenced by the fact that in 1936 the cases of canine rabies were but 57 per cent. of those of the previous year, that in 1941 the reduction as compared with 1935 was 97·7 per cent., and that since 1944 no case of rabies has occurred among animals in the Department of Montevideo.

Moreover, in order to prevent the infection of the interior of Uruguay with rabies, which still exists near the country's frontiers, the Government on 4th July, 1946, issued a decree whereby application of the prophylactic measures in force in the Department of Montevideo was extended to the whole territory of the Republic. *G. Stuart*

PLAGUE

THOMPSON, H. V. **Studies of the Behaviour of the Common Brown Rat (*Rattus norvegicus*, Berkenhout). I. Watching Marked Rats taking Plain and Poisoned Bait.** 16 pp., 13 figs. [1948.] London: Ministry of Agriculture and Fisheries Infestation Control.

The author describes observations which he has made on wild brown rats (*Rattus norvegicus*) on a pig farm in England.

Wheat was put down regularly at one spot, which was dimly illuminated by electric light. The area was watched by observers continuously for large parts of a number of nights in succession. After several nights of observation, 13 rats were caught alive. Two of these died; eleven were marked with distinctive individual patterns clipped in the fur, and released. On subsequent nights these individuals were frequently identified visiting the bait. From the nightly consumption of wheat while the 13 rats were present and also during the period of their captivity, it seemed that the total rat population was about 32 to 37, a figure which was confirmed by other methods. It is a matter of some interest that the author has developed a possible method of estimating a population of wild rats.

The watch continued every night after the eleven marked rats had been liberated. With one exception they were frequently seen visiting the bait and remarkable differences were observed between individuals, for instance, in the number of visits that a rat pays to its feeding place per hour or per night. The author seems satisfied that in spite of illuminating, trapping and watching, the success of the work was not prejudiced and that the behaviour of the rats was normal.

The paper is interesting, not so much for the facts in it, but because it introduces new methods and helps to develop a useful, fresh point of view.

P. A. Buxton

WAGLE, P. M. **Recent Advances in the Treatment of Bubonic Plague.** *Indian J. Med. Sci.* 1948, Aug., v. 2, No. 8, 489–94.

The results of trials carried out at different times and places in India have satisfied the author that anti-plague serum of the Haffkine Institute, Bombay, sulphonamides, and streptomycin, cause significant reductions in the plague

fatality rate. The table shows the results observed in septicaemic cases; these are classified in accordance with the number of colonies grown from 0·25 ml. blood, cultured by a method described in the paper.

	Group I (1–10 colonies)			Group II (11–300 colonies)			Group III (over 300 colonies)		
	Cases	Deaths	per cent.	Cases	Deaths	per cent.	Cases	Deaths	per cent.
Serum ...	29	7	(24·1)	30	17	(56·6)	12	12	(100)
Sulphathiazole	41	9	(21·9)	61	23	(37·7)	30	23	(76·6)
Sulphadiazine	24	1	(4·1)	21	4	(19·0)	16	8	(50·0)
Streptomycin	12	0	(0·0)	9	0	(0·0)	11	3	(27·2)

Sulphapyridine gave less satisfactory results than the other sulphonamides; sulphamerazine gave much the same results as sulphathiazole, but the number of cases treated was small. Sulphadiazine was regarded as the best of the sulphonamide drugs, and streptomycin "is found to be the most effective drug in the treatment of bubonic plague in the light of present-day experience."

The dosage of sulphadiazine usually employed was 4·0 gm. initially, followed by 2·0 gm. four hours later, and then 1·0 gm. every four hours till the temperature had remained normal for two days, but the maximum duration of the course was 10–12 days. Treatment with this and the other sulphonamides was oral when possible; parenteral administration was reserved for patients unable to swallow, and it was considered advisable to give an initial dose of 2·0 gm. intravenously in every severe case.

[The above dosage differs from that recommended previously by SOKHEY and the author, *viz.* 2·0 gm. every four hours (this *Bulletin*, 1947, v. 44, 418).]

Streptomycin was given intramuscularly: the initial dose was two-thirds of a gramme, then one-third of a gramme every four hours till the temperature had remained normal for 24 hours; in severe cases the full initial dose was repeated every four hours till the temperature had remained normal for two or three days. The total dosage varied from 4·0 gm. to 25 gm., but the latter quantity was needed in only one exceptional case. Two patients developed a mild temporary psychosis, and another had a mild dermatitis, otherwise there were no toxic symptoms. [See also this *Bulletin*, 1948, v. 45, 597.]

John W. D. Megaw

BROWN, J. H. **Alberta: the only Rat-Free Province in Canada.** *Canadian J. Pub. Health.* 1948, Sept., v. 39, No. 9, 367–74, 4 figs.

This is a preliminary note dealing with a study of the remarkable circumstance that rats have not yet succeeded in establishing themselves in the Province of Alberta in Canada.

The first invasion of Western Canada by rats is said to date from about 1900, since when a progressive extension of their range has occurred from Minnesota and the Dakota territory. The invasion is found to be arrested or retarded by mountain ranges and rivers and by the intervention of uninhabited areas; it is accelerated when overcrowding among rats compels them to wander in search of food. Rat-proofing is an important factor in preventing the entry of rats into a new area, but other control measures like trapping and poisoning tend to drive them out into adjacent uncontrolled areas and so to speed up the spread of the rats.

Large-scale programmes of rat exclusion and rat control are believed to have a prospect of success in excluding rats from the Province.

Rats have often been reported from different places in Alberta during the past 40 years, but on each occasion they have been detected and destroyed, thanks to the high degree of rat-consciousness existing among the inhabitants.

The author recommends the setting up of a rat-exclusion campaign in the strip of land on the west bank of the South-Saskatchewan River 50 miles east of the provincial border ; he points out that the discovery, in 1939, of plague infection among prairie gophers (*Citellus richardsoni* Sabine) in the province indicates that the introduction of rats would create a serious risk of the spread of infection to man. *John W. D. Megaw*

CHOLERA

In der Beeck, M. Die Epidemiographie der Cholera in Frankreich. [**The Epidemiography of Cholera in France.**] *Ztschr. f. Hyg. u. Infektionskr.* 1948, July 16, v. 128, Nos. 1/2, 228–42, 8 figs. [56 refs.]

Little, P. & Subbarow, Y. **The Mouse-Protective Test as a means of determining the Inhibitory Effect of Chemicals on Vibrio Cholera.** *J. Immunology.* 1948, Oct., v. 60, No. 2, 299–302.

"Mouse-protective tests were carried out against *Vibrio cholera* using fifty-seven different chemicals. The chemicals were selected because of activity in *in vitro* tests against *Vibrio cholera* as reported by McKenzie and co-workers. The only chemicals showing superior activity were 2-sulfanilamidopyrimidine and its 5-bromo, 5-chloro, and 4-methyl derivatives. Animals having been protected by chemicals were immune when re-inoculated with *Vibrio cholera*. The xanthene dye, pyronin *Y*, and the thiazine dye, new methylene blue *N*, showed slight activity."

Dawson, C. E. & Blagg, W. **The Effect of Human Saliva on the Cholera Vibrio in Vitro : a Pilot Study.** *J. Dental Res.* 1948, Oct., v. 27, No. 5, 547–52, 2 figs.

Investigations carried out in Egypt showed the presence of an antibacterial agent active against *V. cholerae*, in the saliva of normal healthy persons ; activity varied considerably in the same individual at different times. Saliva samples from cholera patients showed only slight activity or none. "The properties of this agent may be summarized as follows : in addition to killing cholera bacillus, it also kills typhoid bacillus ; passes through a Seitz filter ; is destroyed at 75°C. in five minutes ; is destroyed at 3,000 r.p.m. in thirty minutes ; is partially inactivated after twenty-four hour incubation at 37°C. ; is partially inactivated after fourteen days refrigeration at 8°C. ; and is completely inactivated by 1/800 N. acid." It is considered that the active principle is a product of the salivary gland secretion and that it has the properties of an enzyme. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

NAJIB KHAN. **Problem of Amoebiasis.** *Indian J. Med. Sci.* 1948, Oct., v. 2, No. 10, 641–51. [23 refs.]

A general review.

CARRERA, G. M. & CHANGUS, G. W. **Demonstration of Acid Phosphatase in** *Endamoeba histolytica*. *Proc. Soc. Exper. Biol. & Med.* 1948, July–Aug., v. 68, No. 3, 610–11, 1 fig.

"The presence of acid phosphatase in *E. histolytica* has been demonstrated by a modification of Gomori's histochemical method."

MELLO, L. da S. A amebiáse e o sinal do hipogástrio esquerdo subjectivo. [**The Left Hypogastric Sign of Amoebiasis.**] *Rev. Brasileira Med.* Rio de Janeiro. 1948, July, v. 5, No. 7, 516–19.

In patients who have suffered from amoebic dysentery, pain can often be elicited by palpation over the left hypogastrium, along the descending colon and sigmoid. The author here, however, refers to subjective pain in this region, complained of when the patient undertakes some spontaneous exertion, exercises, dancing, bicycling, or children running about, a pain like a stitch in the side. He avers that, even though faecal examination yields no positive signs of amoebiasis, such may be found later and treatment for this condition often cures completely. The transitory nature and the spontaneity of the pain would seem to be the important characteristics, for there are many other possible causes of pain in this region. Cases are referred to which illustrate the author's thesis. *H. Harold Scott*

CLARK, R. H. P., BERCOVITZ, Z. T. & JONES, R. F. **Pneumo-Peritoneum in the Diagnosis of Amebic Liver Abscess.** *Amer. J. Trop. Med.* 1948, July, v. 28, No. 4, 545–50, 4 figs.

The apparatus consists of two bottles with rubber tubing, a water manometer and an adapter for the sterile tube and needle which convey the air to the peritoneum.

The patient is prepared by a prior hypodermic injection of morphine. The site of election for introducing air into the peritoneum is about 1 inch below the umbilicus and almost the same distance to the right of the midline. An 18- or 20-gauge needle is used. It is essential that the air be flowing through the needle at the time it is introduced into the peritoneum and the pressure should be maintained at about 10 cm. of water. This will prevent contact with the bowel and consequent injury. When the peritoneum has been entered there is a sudden drop of 5 cm. in the manometric pressure. During the time the air is introduced the pressure should be adjusted to 10 cm. of water, and about 400 cc. to 1,000 cc. of air would be given, depending on the size of the patient.

A total of 30 patients has been studied. Those cases selected include :—

(*a*) Irregularities of the diaphragmatic shadow in which pneumoperitoneum revealed the dome of the liver to be normal in contour.

(*b*) Changes in the contour due to amoebic hepatitis with adhesions between the liver and diaphragm.

(*c*) Amoebic abscess of the liver showing the cavity with air following aspiration of pus and pneumoperitoneum revealing the relationship of the diseased liver to the diaphragm.

(*d*) Carcinoma of the liver, for comparison.

In the third group (*c*) one patient, an Indian male, is included. He had an amoebic liver abscess from which 4,600 cc. of pus were removed by aspiration.

In this case, 1,000 cc. of air were introduced into the abscess cavity. A pneumoperitoneum with 500 cc. of air was performed. In the postero-anterior view the abscess cavity only was visualized, while in the lateral view there was evidence of adhesions between the liver and diaphragm. Further evidence of adhesions was seen in the right lateral decubitus view.

It was possible to show the amount of remaining liver tissue by the combined use of pneumoperitoneum and injection of air into the abscess cavity.

The advantage of pneumoperitoneum is well demonstrated in the diagnosis of a case of carcinoma of the liver which shows the carcinomatous nodules on the dôme of the liver clearly. *P. Manson-Bahr*

TJIONG NJAN HAN. Het tropische leverabsces. [**Tropical Abscess of the Liver.**] *Med. Maandblad.* 1948, Aug. 1, No. 25, 504–8. [14 refs.] English summary.

Twelve tropical liver abscesses occurred in men only between the ages of 20–50 years in Soekabaemi, Netherlands East Indies. As regards race, five were in Chinese, six in Sudanese and one in an Amboinese. Eight of the abscesses were situated in the right lobe, four in the left. One ruptured into the abdominal cavity, another through the abdominal wall to form a tumour-like growth in the surrounding skin. In one a subphrenic abscess developed. Three caused a distinct bulging of the abdominal wall while two gave rise to a considerable abscess. The associated temperature was not high and in some it was normal, but the relatively increased pulse rate constituted a valuable differential diagnostic sign. A high leucocytosis was recorded in three cases, but in the others the leucocytes ranged from 3,000 to 8,000 per cmm. Amoebae or cysts were found in the faeces in 33 per cent.

In nine instances, active amoebae were found in the pus, and in one, it is emphasized, cysts of *E. histolytica* were present in the "prune-juice" pus, as well as in the yellow pus.

In the majority of cases the liver abscess probably develops at least 4–5 years after the amoebic dysentery.

Treatment consisted of the evacuation of the pus, drainage and sometimes irrigation with emetine, followed by a combined course of emetine injections with quinoxyl [Yatren] and rivanol by the mouth. *P. Manson-Bahr*

LUIS CARRI, E. Amibiasis intestinal y alergias respiratorias. [**Intestinal Amoebiasis and Respiratory Allergy.**] *Prensa Méd. Argentina.* 1948, July 30, v. 35, No. 31, 1477–82. [20 refs.]

An interesting record. The author notes that among 120 patients who were passing *E. histolytica* or its cysts there were 12 who suffered from symptoms of respiratory allergy, 3 with spasmodic attacks of asthma and 9 with other allergic symptoms, cutaneous, digestive, nervous, etc. Six cases are described fairly fully. These may be summed up by saying that they showed the usual signs of allergy and tests were made with a large number of substances—dusts, pollens, milk, animal hair, vegetal substances, etc.—with varying results. The usual antispasmodics were tried with perhaps temporary but no permanent benefit. Faecal examination having revealed the presence of *E. histolytica* or its cysts, emetine was prescribed and followed by Yatren 105. In each case improvement soon took place and was maintained. *H. Harold Scott*

BEEMER, A. M., SAMUEL, E. & SHEDROW, A. **The Secondary Infection in Chronic Amoebic Colitis. A Clinico-pathological and a Radiological Study.** *South African Med. J.* 1948, Oct. 9, v. 22, No. 19, 612–24, 10 figs. [28 refs.]

The medical histories of five cases of colitis seen in S. Africa are recounted in detail and, apart from suspicion, on what appears to be flimsy evidence, in no instance has it been proved, either by faeces examination, or by sigmoidoscopy, that *Entamoeba histolytica* played any part in the causation of symptoms. It may be justly asked upon what was the title of this paper founded? The reader is left to infer that the radiographic appearances afforded by barium enema were regarded as conclusive. If this is so, then the whole *raison d'être* falls to the ground and the critic is left wondering what could have prompted the sweeping assertion that "it is probable that, although *Entamoeba histolytica* causes the original pathological lesion, secondary infection alone is responsible for clinical symptoms." The criticisms which are directed to the radiographs which illustrate this paper are these:—Small filling defects are produced by most forms of colitis, but usually in Europeans the amoebic ulcerations are so superficial and the actual lesions so small that no distortion of the normal outline is produced. This statement also applies to the irregular outline and cone-shaped appearance of the caput caeci on which stress is laid. This, too, is seen in other forms of chronic intestinal disturbance, whilst the ragged outline of the transverse colon in fig. 4, and the saw-tooth edge of the descending colon in fig. 7, are clearly those of diverticulitis. The hard fact emerges that, except in the most advanced stages with extensive and deep ulceration and where anatomical alterations have been produced, no radiological picture typical of intestinal amoebiasis can be said to exist. *P. Manson-Bahr*

COUTELEN, F., BIGUET, J. & COCHET, G. Étude morphologique et cytologique d'un flagellé nouveau, *Trichomonas natricis* n. sp., parasite de l'intestin des colubridés *Natrix natrix*, et *Natrix viperinus*. [**Study of a New Flagellate** *Trichomonas natricis*, **Parasitic in the Intestine of Calubrine Snakes,** *Natrix natrix* **and** *Natrix viperinus*.] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 533–5, 13 figs. on 2 pls.

COUTELEN, F., BIGUET, J. & COCHET, G. La culture de *Trichomonas natricis*. Développement et longévité des colonies en fonction de la composition des milieux. [**Culture of** *Trichomonas natricis*. **Development and Viability of Colonies in relation to the Composition of the Media.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 536–8. [15 refs.]

COUTELEN, F., BIGUET, J. & COCHET, G. Temperatures léthales et température optima pour la multiplication de *Trichomonas natricis*. Évolution du pH des cultures en fonction de la présence d'amidon de riz. [**Lethal and Optimal Temperatures for Growth of** *Trichomonas natricis*. **Evolution of pH in Cultures in relation to the Presence of Rice Starch.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 539–43. [11 refs.]

LEPROSY

ZANETTI, V. Contributions à la connaissance de la lèpre au Congo Belge. Epidémiologie — évolution clinique — classification. [**Epidemiological, Clinical and Taxonomic Study of Leprosy in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1948, Mar. 31, v. 28, No. 1, 105–46, 3 graphs.

This is a detailed study of ten years' work in the Belgian Congo on the control of leprosy, which brings out the following points from the experience

gained in village agricultural colonies. The evolution of the disease has been closely studied. Cases with macules and showing minor and major tuberculoid lesions are first considered and include 215 patients, thirty per cent. of whom were in children. Of those with a single macule most occurred between the ages of 21 and 40 years and 61 per cent. of the lesions were on the posterior part of the body. One-fourth of the patients acknowledged contact with other patients; only a few showed any appreciable number of leprosy bacilli in their lesions. Next, patients with multiple lesions, but no nerve symptoms, are considered, including those with tuberculoid lesions. They formed 10·8 per cent. of the total cases. Natural cure occurred in 23·6 per cent. of them. Examinations for lepra bacilli by multiple scarifications were negative. Maculo-nervous cases, Na of the Cairo classification, were benign and showed frequent recoveries. They formed 57·3 per cent. of all cases. Some, however, in a longer or shorter time developed serious mutilations of the hands and feet, apart from which clinical cures took place and their evolution was slow. This class of case is most frequent between the ages of 11 and 25 years of age. Lepra bacilli are rare in the great majority of these cases, with only 19 per cent. positive. The macules commonly clear up. Bacteriologically positive and transitional cases are next dealt with: they formed only 8·3 per cent. of the total. They showed unstable equilibrium resulting in the presence of very numerous lepra bacilli, especially in the ears. In 19 of them, progressively lepromatous development occurred.

The typically lepromatous cases formed 12·7 of the whole number of cases; a relatively small proportion. A larger proportion occurred in males than in the milder form of the disease and nodular cases were more frequent than those with diffuse lesions. As usual they showed very numerous lepra bacilli and they were most frequent between the ages of 6 and 25 years and very few after the age of 40. The first lesion occurred most frequently on the posterior surface of the body and least so on the neck. In only 46 per cent. was a history obtained of their previous exposure to infection. Thus the evolution of the disease to the lepromatous form is related to the relative number and dissemination of the lepra bacilli due to feeble resisting power to their multiplication and dissemination in the body. *L. Rogers*

CHAUSSINAND, R. L'infection murine due au bacille de Stefansky n'est pas une "lèpre". [**Murine Infection by Stefansky's Bacillus not a "Leprosy".**] *Bull. Acad. Nat. Méd.* 1948, v. 132, Nos. 27/28, 486–7.

TISSEUIL, J. Essai de pathogénie des lésions lépreuses et tuberculeuses. [**Study of Pathogenicity in Leprous and Tuberculous Lesions.** *Bull. Acad. Nat. Méd.* 1948, v. 132, Nos. 19/20, 363–5.

PARDO CASTELLO, V. & PIÑEYRO, R. Los cambios anatomo-patologicos de los nervios en la lepra lepromatosa. [**Histological Changes in the Nerves in Lepromatous Leprosy.**] *Rev. Sifilografía, Leprología y Dermatología.* 1948, Apr., v. 5, No. 2, 265–9.

Most of the records of nerve changes in leprosy have been reported in the tuberculoid form. In this contribution the authors detail the changes seen in 17 cases of the lepromatous type. Fragments of the nerves were taken as soon as possible after death, fixed in 10 per cent. formol, passed through the paraffin-embedding method and sections were stained in various ways: haematoxylin and eosin, Van Gieson, orcein and haemalum, Ziehl-Neelsen, and silver impregnation. The pathological changes found were analogous with, in fact the same as, those in the skin and internal organs, in the blood and lymphatic

vessels and in the production of fibrous tissue. There is a condition called by the authors pan-vascularitis, with perivascular accumulation of lymphocytes and histiocytes, crammed with lepra bacilli. There is a chronic interstitial neuritis. Large foamy cells are seen and many with still larger vacuoles, a "Gruyère cheese appearance", and giant cells, and, terminally, fibrosis and hyalinization.

Seeing that this condition of the nervous tissue is so marked in the lepromatous form, the authors are of opinion that the neural type, as a term for a separate clinical variety, should be dropped. *H. Harold Scott*

FLOCH, H. & CAMAIN, R. Réaction de Mitsuda, immunité anti-lépreuse et vaccination par le B.C.G. [**The Mitsuda Reaction, Immunity to Leprosy and BCG Vaccination.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 172.* 1948, May, 4 pp. [11 refs.]

MAUZÉ, J. & PILIN, E. Mlle. La séro-agglutination de Hollande chez 61 lépreux de la Guadeloupe. [**Hollande's Sero-Agglutination Technique in 61 Cases of Leprosy in Guadeloupe.**] *Ann. Inst. Pasteur.* 1948, June, v. 74, No. 6, 510–12.

PEDROSO CRUCET, J. Ausencia de prurito inducido en el diagnostico de lepra. [**Absence of Induced Pruritus in the Diagnosis of Leprosy.**] *Rev. Sifilografia, Leprologia y Dermatologia.* Marianao, Cuba. 1948, Apr., v. 5, No. 2, 263–4.

In the test for leprosy by injection of histamine the weal produced is accompanied in the healthy skin by itching, but not in the non-characteristic or tuberculoid form of the disease. The author has observed that in negroes or those with a dark skin, where colour changes on histamine injection are not distinct, 5 per cent. formic acid gives a similar and even more marked itching. If one deposits a drop of the acid on normal skin and then pricks the skin with a needle through the drop a slight burning is felt, then an erythema appears followed after a varying interval by an itching papule and very marked reddening. In leprosy patients, such a procedure results in the weal formation but no itching. Intracutaneous injection of 0·01–0·02 cc. of the formic acid solution into healthy skin causes a marked sensation of burning lasting for several minutes and due to the caustic action of the acid. This is absent in the anaesthetic skin of a leprosy patient. The author believes this to be a valuable test in those suspected of leprosy, the colour of whose skin makes it difficult, perhaps impossible, to determine the histamine reaction.

H. Harold Scott

LAI, Shang-Ho. **On the Value of Superficial Nerve Hypertrophia in the Diagnosis of Leprosy.** *Chinese Rev. Trop. Med.* 1948, Jan., v. 1, No. 1, 29–42, 3 figs.

This paper deals with extensive examinations for thickening of superficial nerves of Chinese subjects in the diagnosis of leprosy. Those searched for include the supra- and infra-orbitals, great auricular, ulnar, median and radial, peroneal and the tibial. In 3,072 healthy children of 8 to 15 years of age, the nerves of the arm and leg and the great auricular were more frequently felt and the infra-orbital least so. Among 8,990 healthy adults, the results were much the same except that the supraorbital nerve was more rarely affected. Thus it was found that such nerves can be felt in a great number of healthy persons and the numbers are larger in men than in women and children ; those on both sides are perceptible more frequently than on one side in both sexes.

Similar investigation on leprosy patients showed in males 90 per cent. with enlarged ulnar nerves, 82 per cent. enlarged great auricular, 60 to 41 per cent. enlarged medial, radial, peroneal and tibial nerves, but only 7 to 5·1 per cent. of the orbital nerves. In women, much the same relationship was found, but with rates of from 67 to 33·6 per cent. in all but the orbitals, which showed 5·2 to 3·7 per cent. enlarged. In both sexes the rates were higher than in healthy persons; these findings are illustrated by a diagram. The degree of thickening is greater in leprosy cases, but at post-mortem examination little thickening was found probably owing to loss of congestion. *L. Rogers*

DELPERDANGE, G. R. Note sur la lèpre en Afrique centrale. [**A Note on Leprosy in Central Africa.**] *Rev. Paludisme et Méd. Trop.* 1948, July–Aug.–Sept., v. 6, Nos. 50, 51 & 52, 207–8.

The title of this paper is misleading, as it deals solely with important observations on the date of appearance of lepra bacilli in an African, the husband of a woman with nodular leprosy, who was observed three years before the first clinical signs appeared. The husband when first seen was healthy and bacteriologically negative; activization by iodine was also negative. Section of a removed lymphatic gland showed nothing on staining except very light acidophiles in certain monocytes stained by Leishman's method.

The man continued to cohabit with his wife against medical advice. Microscopical examinations were therefore carried out every three months: in sections of lymphatic glands, red granules first appeared and after two and a half years slightly acid-fast bacilli also appeared. Six months later, the first lesions of leprosy appeared and the case evolved into one of nodular leprosy in spite of treatment three years after the first suspicion of the disease. Early injection of tuberculin was negative and that of a preparation from the wife's nodule gave a doubtful reaction. It is concluded that by bacteriological examination it was possible to diagnose leprosy at a stage when clinical signs were not apparent. *L. Rogers*

COSTA, O. G. & ALEXIO, H. B. **Tuberculoid Leprosy: Warty Lepride.** *Brit. J. Dermat. & Syph.* 1948, July–Aug., v. 60, Nos. 7/8, 243–8, 5 figs.

This paper describes and illustrates a case of tuberculoid leprosy with unusual variety of lesions. These included psoriasis-like leprides on the back, with or without a peripheral leucodermic halo, and of a circular, ovoid or figure-of-8 tuberculo-squamous form; ichthyosiform leprides were present on the front of the leg and those resembling granuloma annulare on the hand; plantar keratoderma dissipatum was seen on the soles of the feet and a verrucose lepride on a finger. *L. Rogers*

TISSEUIL, J. Au sujet du traitement de la réaction lépreuse par le bleu de méthylène et par l'émétique. [**Treatment of Leprosy Reaction with Methylene Blue and Tartar Emetic.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 445–7.

The following is a translation of the author's summary:—

Methylene blue and tartar emetic each has its own indications in the treatment of leprosy reaction, without either being the sole remedy. Many other medicaments have also given good results in the treatment of this reaction.

H. J. O'D. Burke-Gaffney

METCALFE, J. W. **Importance of Leprosy in Orthopedic Surgery.** *U.S. Nav. Med. Bull.* 1948, Sept.–Oct., v. 48, No. 5, 656–67, 12 figs. [19 refs.]

HELMINTHIASIS

SEFERIAN, V. & MAMO, A. Un cas de bilharziose vésico-rectale en Djezireh (Syrie). [**A Case of Vesico-rectal Schistosomiasis in Djezireh (Syria).**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 487–90.

CAIRO: MINISTRY OF PUBLIC HEALTH. MEDICAL AFFAIRS. **5th Annual Report of the Bilharzia Snail Destruction Section 1946–1947** [ABDEL AZIM, M. (Director) & BARLOW, C. H. (Expert)]. pp. vi+37, 5 maps (4 folding) & 3 figs. 1948. Cairo: Govt. Press.

The reports of this Section are always valuable; they record the results actually achieved by application on a large scale of the control measures worked out experimentally on a small scale. It is, of course, important that the field results should be placed on record regularly, and this is done by the active Egyptian organization under the direction of Dr. M. Abdel Azim the Director, and Dr. C. H. Barlow the Expert officer, of the Bilharzia Snail Destruction Section.

The object is to reduce snail infestation to a level low enough to render the completion of the life cycle of the schistosomes, if not impossible, at least difficult. Complete eradication would multiply cost very greatly, and is not attempted. Surveys to detect and assess infestation were made by net-dipping, but more recently the method which employs palm-leaf traps has been found to be a much more effective means of detecting scanty infestation. Copper sulphate is largely used at an initial concentration of 30 parts per million. The active copper is rapidly absorbed during the first few hours, the concentration falling to one tenth after 4 hours. In canals impossible to treat with copper sulphate, or to clear (either because agricultural needs preclude treatment, or because treatment would be too expensive), treatment by palmleaf traps is used, and in this way 54,476 *Bulinus* were removed from 454 kilometres of main canals in the Fayoum. Where possible, it is routine practice to treat all streams infested with *Bulinus*, whether these are producing cercariae or not.

Infestation of main streams is much greater than infestation of branch streams, chiefly because difficulties of water-closure have prevented treatment of the main streams. During the year these difficulties prevented the treatment of 200 infested streams measuring 1,500 km.; the authors have repeatedly asked for powers to carry out the necessary work, but apparently without success.

In the Giza Province a large number of pot-holes, which never dry and which were full of snails constituting an active danger to men using the Archimedes screws, were treated.

Details are given of the progress made and the work done in each Province, and there is some discussion of the obstacles met. On the whole, snail control is showing results, but involves much expenditure of energy and money, and considerable organization. The results are not, in this Report, related to the incidence of schistosomiasis. The presence of *Bulinus* snails is mentioned or taken for granted in all Provinces, but that of *Planorbis* is referred to only in the Delta north of Cairo, and part of Giza Province.

Certain experiments are described. *Physopsis africana* from S. Africa were successfully infested with Egyptian strains of *Schistosoma haematobium*, but attempts with *S. mansoni* failed. On the other hand, *Australorbis glabratus* from Venezuela were successfully infected with *S. mansoni*. Attempts to infect *Bulinus tropicus* from S. Africa failed with both *S. haematobium* and *S. mansoni*.

White mice were experimentally infected with *S. mansoni*, and began to pass viable eggs in 40 days; the whole life cycle, through mice and *Planorbis boissyi*, was completed in 75 days. With *S. haematobium* development in the mice was slow, and viable eggs were not found in the faeces until 100 days after infection; the life cycle through mice and *Bulinus truncatus* occupied 135 days.

The effect was investigated of copper sulphate in Nile water on eggs of *Bulinus*; 30 p.p.m. at 22°–28°C. killed 99 per cent. in 1 hour, but even 3 hours' exposure did not kill them all, probably because the central eggs in some clutches were protected mechanically by the other eggs and the gelatinous matrix.

The egg output of self-fertilized *B. truncatus* was higher than the output of cross-fertilized snails; the egg output of *B. truncatus* infected with *S. haematobium* was very much less than the output of normal snails, and the mortality among the infected snails themselves was high, only 1 of 10 surviving for one month, against 7 survivors of 10 normal snails. In a parallel experiment with *Physopsis africana*, the infected snails did not lay any eggs.

A repellent varnish applied to the skin of mice prevented penetration by cercariae, but it is too expensive for widespread use in man. *Charles Wilcocks*

WALKER, A. J. **Aspects and Prospects of Schistosomiasis Control on the Kenya Coast.** *East African Med. J.* 1948, Sept., v. 25, No. 9, 362–6. [11 refs.]

Infection with *Schistosoma haematobium* is now well established in the coastal areas of Kenya, where rates of 60 to 70 per cent. have been found in schoolboys. Conditions are very favourable for the snail host, most of the water being in swampy lakes, dams and pools of dried rivers; these stagnant waters are infested with snails of the genus *Bulinus*. The available water supplies are heavily used, and heavily contaminated, especially in the dry season.

The author discusses the various schemes which have been tried, in the Sudan and elsewhere, for the control of schistosomiasis. These have aimed at prevention of contamination of water, destruction of snails and cercariae, and treatment of infected persons. He notes the failure of propaganda in the Sudan, and the difficulty of using copper salts in small collections of stagnant water. Gammexane and DDT are poisonous to snails, and the former, or the delta isomer of benzyl hexachloride, may prove very useful in the control of both snails and mosquitoes. Measures against cercariae include storage or heating for small quantities of water such as may be used in labour lines, or repellents like benzyl benzoate and dimethyl phthalate. The author refers to the well-known work of BLAIR and ALVES on intensive treatment. He admits that the fight against schistosomiasis in the coastal areas of Kenya has not yet begun. *Charles Wilcocks*

EAST AFRICAN MED. J. 1948, Sept., v. 25, No. 9, 372–3. **The Prevention of Bilharzia Haematobium Infection.**

This short note (written by an Administrative Officer) is full of good sense; several important points are made. Where infection with schistosomes is inevitable, propaganda on the subject of avoiding infection is useless; but if it is possible to avoid infection, then propaganda, especially in schools, will be useful. Where means of prevention are known and possible, the important point is cooperation between the medical officer and the district commissioner, and between the administrative and medical departments at all levels. It may be impossible to carry out the complete plans suggested by the medical officer, and he may be compelled to accept something short of his full wishes in order to obtain greater African cooperation. This he should do with good grace, but

he must be supported by the administration. The most important method of education is by personal discussion with small groups of people, or even individual persons, and the most powerful weapon in overcoming apathy (which, more than hostility, is the main enemy) is " persistent badgering ".

Charles Wilcocks

PESIGAN, T. P. **Schistosomiasis Reconnaisance in Northwestern Mindanao.** *J. Philippine Med. Ass.* 1948, Sept., v. 24, No. 9, 495–505, 2 maps on 2 pls.

The author, who recently confirmed the existence of a focus of *S. japonicum* infection in South-eastern Luzon, Philippine Islands [this *Bulletin*, 1948, v. 45, 622], was told by a physician that there were suspected cases in North-western Mindanao. He therefore made a tour of the area around Panguil Bay, staying there for about 2 weeks and examining the faeces of 304 persons in the villages visited. The examinations consisted of 4 direct coverslip preparations, and in this way positive results were found in 111 of the persons examined. This figure should not be regarded as an indication of the incidence in the population as a whole, since the persons examined had symptoms suggesting the infection, but the rate is high in view of the fact that there had not been any previous confirmation of cases from the area.

Oncomelania quadrasi were found in several places, some of them infected with fork-tailed cercariae.

Endemic foci are most likely to be found in low, level, wet plains, without a dry season, suitable to the cultivation of lowland rice. A map showing 4 types of climate, and the known foci, is given for the Philippine Islands as a whole.

Ascaris infection was found in 70 per cent., hookworm in 65 and *Trichuris* in 34 per cent. of the people examined ; 7 patients had *Entamoeba histolytica*, 2 *Balantidium coli* and 1 *Paragonimus* ; a few other infections were also diagnosed.

Charles Wilcocks

NARDONE, P. M. La distomiasi sinense. Contributo allo studio delle sindromi da " Clonorchis sinensis " nell'estuario dello Yangtzekiang e nella zona di Shanghai. (Cura chirugica con fistola biliare terapeutica). [**Clonorchiasis in the Yangtsekiang Estuary and in the Shanghai District.**] *Ann. di Med. Nav. e Colon.* 1948, Jan.–Apr., v. 53, No. 1, 59–78. [17 refs.]

The only part of this article on infestation by *Clonorchis sinensis* which will be new to readers of the *Bulletin* is that dealing with treatment. Hitherto gentian violet has been recorded as beneficial in some cases, but most writers have agreed that no satisfactory treatment is known. The author finds drug treatment unsatisfactory, though antimonials, such as Fouadin, may help. The only treatment which he found really availing was surgical. In early cases and with mild infestations he has obtained cure, without relapse, in 8 patients by the following method : Preliminary injection of Fouadin to test susceptibility and if there is no reaction 5 cc. are injected on alternate days " to the tenth " [? day or dose, but probably the latter, from what follows] ; then gentian violet is given in capsules by the mouth to a total of 3 gm. 40 mgm. in 20 days, and, after 10 days' interval, another 10 phials of Fouadin, followed, as before, by the gentian violet. All through, 6 tablets of " Normo-Heparin " are given daily as a cholagogue.

In more advanced cases such treatment is insufficient and in view of the infestation ending fatally or of its producing cirrhosis or carcinoma, surgical intervention is called for. Drainage by duodenal sound is impracticable because this cannot be continued for an indefinite period. The author's procedure is as follows : With local anaesthesia he seals off and then opens the gall-bladder and drains it externally by a Pezzer tube. At the same time as the drainage

goes on an antimonial is administered. Adult worms, living and dead, and large quantities of ova pass out by the drain, which is left for 20 days; the tube is then removed and in a few days the opening closes. The patient attends as an outpatient for gentian violet treatment as above and after 4 weeks the Fouadin injections are repeated.

The author states that in the past three years he has treated in this way 12 patients with complete success and no relapses. *H. Harold Scott*

AUDOYE & DESSAUSSE. Sur un nouveau cas d'infestation par la grande douve du foie "fasciola hepatica". [**A Case of** *Fasciola hepatica* **Infestation.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1948, Nos. 26/27, 920–23.

A "classical" case, followed up in Cherbourg for 4 years.

CASTRO JENKINS, A. Fascioliasis hepatica humana en Costa Rica (Presentación de un caso). [**Human Fascioliasis.**] *Rev. Kuba Med. Trop. y Parasit.* 1948, Aug., v. 4, No. 8, 160–61, 1 fig.

This is said to be the first autochthonous case in Costa Rica.

GALLIARD, H. La distomatose intestinale humaine à *Fasciolopsis buski* au Tonkin. [**Human Infection by** *Fasciolopsis buskii* **in Tonking.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 3/4, 214–17.

Infection of man by *Fasciolopsis buskii* is relatively common in parts of China, Formosa, Siam, Borneo and Sumatra, Assam and Bengal; on the other hand, it is generally recognized as being very rare in Tonking.

The author, with DANG-VAN-NGU [this *Bulletin*, 1942, v. 39, 13] has reported 5 cases originating in Tonking. In three cases the infection was discovered during post-mortem examinations, in one during a gastro-enterostomy, and in one by finding eggs in the stools and subsequently the adults after treatment with oil of chenopodium. He now reports two other cases. In one patient who suffered from alternate diarrhoea and constipation, eggs were found in the mucus that surrounded a constipated stool. He was not successful in eliminating the adults, but the eggs diminished after treatment. It was not possible to follow this case for long.

The second patient was in hospital with jaundice and hepatitis: he vomited a worm, numerous eggs were found in the stools, and at autopsy 3 worms were recovered from the duodenum and 3 from the jejunum.

The author discusses the anomaly that in the routine examination of tens of thousands of stools these very characteristic ova have not been found and yet the infection, though rare, does exist. Further, there is a great disparity between the infection in man and the pig. In the latter it is relatively common in Tonking: the author found 12 per cent. and 47 per cent. in March and December in Hanoi, and 11 per cent. to 35 per cent. in North Annam. It is possible that the parasite is ill-adapted to man, but all the specimens he has examined show full development. It is possible that there are two species, a common one found in the pig and a rare one found in man, but again the only difference he has found is in size, the specimens in man being larger. This is however a common experience in parasitology and in a single pig there is a great variation in the size of the worms recovered.

The most simple explanation for the rarity of this infection in Tonking is that the aquatic plants, on which the cercariae encyst, are eaten cooked and the envelope of these plants is not opened by the teeth as in other endemic areas, but opened with a knife.

He concludes that human infestation with *Fasciolopsis* is more frequent than was believed but that the infections being light escape attention, and that this species is ordinarily maintained by the pig and only affects man where the aetiological circumstances are particularly favourable. *L. E. Napier*

MALDONADO, J. F. **The Life History and Biology of *Platynosomum fastosum* Kossak, 1910** (*Trematoda* : *Dicrocoeliidae*). *Puerto Rico J. Pub. Health & Trop. Med.* 1945, Sept., v. 21, No. 1, 17–39, 17 figs. on 3 pls. [Refs. in footnotes.] [Spanish version 40–60.]

VON BONSDORFF, B. **Folic Acid in the Treatment of Pernicious Tapeworm Anemia. *Diphyllobothrium latum* and Pernicious Anemia. XI.** *Acta Med. Scandinavica.* 1948, v. 131, Suppl. 213, 82–90, 4 figs.

The author states that there is no report in the literature on the effect of folic acid (pteroylglutamic acid) in the pernicious anaemia due to *Diphyllobothrium latum* infection. He reports on 4 such cases treated with this substance. In three the diagnosis was certain as the subjects were young and all had free hydrochloric acid in the gastric juice at some time : the fourth patient (aged 53) had no free acid and may have been a case of " cryptogenetic " pernicious anaemia associated with the worm infection.

In all four there was a dramatic response to folic acid, 20 to 30 mgm. per day for 7 to 10 days. There was a sharp reticulocyte response in 3 cases, the highest being 31·1 per cent. on the 7th day, and in all three there was a rapid rise in erythrocytes and haemoglobin. The worm cure was affected with " Filicin ", 3·5 to 4·0 gm., at a later date. The removal of the worms had no effect on the rate of rise of the erythrocyte curves.

The author points out that it has previously been shown that the response of tapeworm pernicious anaemia is as good as that of cryptogenetic pernicious anaemia to liver extracts and stomach extracts by mouth, but not to gastric juice and meat. He has shown that the patient with tapeworm anaemia secretes intrinsic factor, but that *in vivo* the tapeworm checks the reaction between the intrinsic and extrinsic factors : it has however no effect on the combined anti-anaemic factor. He considers that it is probable that the tapeworm affects the conjugase which in normal persons converts pteroylhaptaglutamic acid (vitamin B_c conjugate) into pteroylglutamic acid (folic acid).

L. E. Napier

MCGILL, R. J. **Cysticercosis resembling Myopathy.** *Lancet.* 1948, Nov. 6, 728–30, 1 fig. [12 refs.]

An account of 2 cases in Indians.

ROMAN, E. & MOREL, P. Évolution de l'éosinophilie au cours de l'anguillulose expérimentale du rat. [**Development of Eosinophilia during Experimental Strongyloides Infection of the Rat.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 543–8, 2 charts.

FINK, H. **A Helminth Survey from an Autopsy Series on Natives of Okinawa, with Comments on Complications of Ascariasis.** *Amer. J. Trop. Med.* 1948, July, v. 28, No. 4, 585–8. [10 refs.]

In the course of 120 autopsies on natives of Okinawa, after its invasion, the incidence of helminth infections was studied by the author. He compares his results with the findings in the same or neighbouring areas (at autopsy or

by egg counts in the living) of BENJAMIN (*U.S. Nav. Med. Bull.*, 1946, v. 46, 495), STEINER (*Arch. Pathology*, 1946, v. 42, 359) and FRANKS *et al.* [this *Bulletin*, 1948, v. 45, 453].

In the present series, the author found 98 helminthic infections in 68 persons. The nature of these is shown in a table which also gives the figures reported by the authors quoted above. It is noted that hookworms were found in 45·8 per cent. of the present author's cases, *Ascaris* in 25·8 per cent. and *Trichuris* in 8 per cent. The average percentage finding of *Ascaris* by the previous three workers was about 44.

The author gives particular notice to findings relating to *Ascaris* and of the parts of the body in which they were found. *Ascaris* was directly responsible for 3 deaths, two from intestinal obstruction (each focus of the distended bowel showing a score or so of worms) and one from hepatic infarction, which it is claimed, is a newly described complication. In this case, an *Ascaris* was found triply folded in the left hepatic duct, which it had dilated. The surface of the left lobe of the liver beneath showed two dentate-shaped haemorrhagic areas, and the cut surface showed a friable haemorrhagic area extending to the inferior surface at the hilum. A small friable thrombus was present in the left branch of the hepatic artery near the dilated duct.

The author notes, and quotes the evidence of other workers to confirm his observation, that the biliary tract of the Okinawan could be dissected with comparative ease, and that the duct system is relatively dilated. He suggests that migration of *Ascaris* is facilitated by this relative dilatation of the duct system. Neither flukes nor calculi were found in any of the 120 cases.

Migration into the biliary tract was also observed in a second case, but without gross changes.

In the 31 cases of ascariasis, *Ascaris* was found at all levels of the gastro-intestinal tract from the mouth to the anus. The worm burden varied from 1 to 50. Occasionally a worm was found in the larynx.

The presence of biliary tract invasion by *Ascaris* is discussed and references to it in the literature are given. Among the observers quoted is GIRGES [this *Bulletin*, 1935, v. 32, 257] who, in addition, has listed 21 complications due to this nematode.

The author concludes that helminth infection is present in about 80 per cent. of the living population of Okinawa, and that the incidence found at autopsy is about 60 per cent. About half of the population showed multiple infections.

H. J. O'D. Burke-Gaffney

BEACH, E. W. **Genital Manifestations in Early Filariasis.** *J. Urology*. 1948, Mar., v. 59, No. 3, 371–5.

In Noumea, New Caledonia, a Marine battalion of the U.S. forces which had come from the Russell Island campaign and had previously been trained in Samoa was surveyed in connexion with a symptom complex from which 160 of 385 men were suffering. This was eventually shown to be due to filariasis.

The condition was characterized by recurrent attacks of lymphangitis and lymphadenitis. The former was often descending or centrifugal in type. Recurrent attacks caused thickening and nodosity of the lymph vessels and enlargement and tenderness of the glands. There was no great prostration and no pyrexia. The glands commonly involved were inguinal (in 147 cases), femoral (108), epitrochlear (56), and axillary (132). The brachial lymph vessels were involved in 78 cases.

Thirty-seven men showed genital involvement. Acute vasitis or funiculitis was most common and occurred in 19 cases, in 3 of which it was bilateral. "It began suddenly with pain and tenderness in the structures near the internal

ring and in a matter of hours had rapidly descended through the inguinal canal and into the scrotum". There was apparently considerable thickening of the vas. In the recurrent cases, the thickening was noted irregularly along the course of the vas. Biopsy showed that the vas itself was not actually thickened, but that there was involvement of the surrounding tissues. The epididymis was usually not involved, but a characteristic finding was "a rolled up, dough-like mass of tunica vaginalis" just beneath the globus minor which persisted after the attack subsided. The testicle on the affected side was tense, swollen and very sensitive. There was an increase of hydrocele fluid: on aspiration the fluid was clear and did not contain microfilariae. The attacks of funiculitis usually lasted 3 to 4 days. Microfilariae were found in the tissues around the vas in 3 out of 5 biopsies.

[The parasitological aspects of this paper should be accepted with caution since it includes the two following statements: "It is remarkable to examine a blood smear from a native to find the field literally alive with squirming adult forms . . . ." and "Neither the presence of the adult worm nor the microfilaria had ever been demonstrated in the tissues of a white man". From the context, however, this last statement might be taken to refer only to the series under review.] *L. E. Napier*

HAWKING, F., SEWELL, P. & THURSTON, June P. **Mode of Action of Hetrazan in Filariasis.** *Lancet.* 1948, Nov. 6, 730–31.

In cotton rats injected with *Litomosoides carinii*, the adult worms lie in the pleural cavities, while the non-periodic microfilariae float in the peripheral blood. When these rats are treated with Hetrazan in doses of 25 mgm. per 100 gm. intraperitoneally, the numbers of these embryos in the peripheral blood diminish. When, however, 6 mgm. per 100 gm. are injected intravenously this diminution is extremely rapid; 80 per cent. disappear in one minute and over 90 per cent. in two, but even after the most intensive treatment a few microfilariae persist. Similarly, the pleural cavities still contain many motile and apparently healthy microfilariae in the vicinity of the adult worms. It appears that these form a reservoir from which the supply in the blood is being constantly replenished. Hetrazan exerts only a moderate effect on the adult worms, so that prolonged intensive treatment is necessary and even then some of the worms escape.

Microfilariae can be maintained alive for several days at 37°C. in serum plus Ringer's solution and glucose, but when Hetrazan is added it has no apparent direct effect upon them; neither has serum from Hetrazan-treated rats any effect. Further studies made from the examination of the distribution of microfilariae in different organs revealed that in Hetrazan-treated rats the microfilariae congregated in the liver, probably in the sinusoids. When the rats were killed six hours after treatment, many microfilariae were surrounded by phagocytes which were attacking them. The lungs form a special case in cotton-rat filariasis as they constitute the chief port of entry for the microfilariae from the extravascular spaces (pleural cavities) into the circulation and their microfilarial content is correspondingly high.

It is concluded that Hetrazan acts by modifying the microfilariae in some way so that they are seized by the phagocytes of the reticulo-endothelium and presumably destroyed. In this respect its action would resemble that of opsonins. Microfilariae which are removed from contact with phagocytes are not speedily affected by hetrazan.

The chemical or physical reactions underlying this "opsonizing" effect of hetrazan are unknown, but they must be rapid in their action.

P. Manson-Bahr

LINDBERG, K. Seconde enquête épidémiologique sur la draconculose dans l'Inde. [**Second Epidemiological Investigation of Dracontiasis in India.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 3/4, 282–93.

A study of dracontiasis was undertaken in Vangarvadi, a village in the State of Hyderabad. It is situated on the banks of a river which is dry for most of the year. The rains, which are not abundant, form ponds which dry rapidly. As a general rule, water is found near the village only from June to September or August to October. Most of the inhabitants obtain their water from a single well in the bed of this river. The villagers descend steps to reach the water in this well.

The Hindu inhabitants, Mahratta cultivators, almost all belong to one caste. There are certain Mussulman families. There are also untouchables (Mangs) who are forbidden to use the well and obtain their water from ponds while it is available, but during the driest seasons they have to use water from the well; this the Mahrattas pour into their storage tanks without touching them. Thus, the whole village drinks water from this well at some time during the year. Boiling of water is almost unknown and the inhabitants seldom filter the water effectively, so that they are all subject to infection from this well.

The total population of the village was 700 to 800, but without official support the author was only able to study 310 persons: of these 82, or 26·4 per cent., had been affected with dracontiasis.

The data are given in tabular form; some points from the digestion of these tables are given below:—

Below the age of 5 years, one child was affected. Nine persons had their first attack at the age of 5, and 7 at the age of 6 years. At the succeeding ages 7 to 20, the following were the incidences of first attacks—1, 1, 4, 3, 0, 2, 0, 3, 5, 0, 1, 2, 3 and 7. At ages from 21 to 36, there were 18 first attacks and one at each of the ages, 49, 63 and 68. Four persons had their first attack "during infancy" and 7 could not state the age of their first attack.

The number of worms from which each individual suffered were as follows:—one worm—19 persons; two—18; three—6; four—5; five—2; six, seven and eight—1 each; ten—2; twelve, thirteen, sixteen, eighteen, twenty-five and thirty—1 each; thirty-five—3; forty and sixty—2 each; sixty-five, eighty, one hundred, one hundred and sixty and two hundred—1 each. In 9 cases there were "many worms" but the number was not known.

Thirty-two persons had suffered from dracontiasis for one year, thirteen for two years, four, four and five for 3, 4 and 5 years, respectively, and eighteen for more than 5 years, the longest period being 50 years.

The maximum number of worms in one year were one in 32 cases, two in 19 cases, three in 10 cases, four in 4 cases, five in 4 cases, and seven or more with a maximum of 50 in the remaining 6 cases; in seven this number was not determined. The localization of the worms was as follows:—Feet—23; ankles—71; legs—81; knees—43; thigh—24; buttock—4; upper limb—26, of which 18 were on the left side; trunk—15; genitalia—10; and head and neck—4.

The author asks why it is that when all were subjected to infection from this well more or less continuously, only a proportion showed infection at any time of their lives, why some have heavy infections and some light, and finally why some are infected early in life others late? Unfortunately, those who had escaped entirely would not allow any examination. [The author gives no indication of the caste distribution of the patients.] *L. E. Napier*

DEFICIENCY DISEASES

TROWELL, H. C. **Medical Examination of 500 African Railway Workers.** *East African Med. J.* 1948, June & Aug., v. 25, Nos. 6 & 8, 236–44; 311–21.

i. This paper presents, in terms intelligible to the layman, the social background and general conclusion of the medical survey. Climate, conditions of work, housing, psychological stresses, and prevailing diseases are briefly described. Details of the diet are to be reported separately. Briefly, the ration issued consisted only of maize-meal and meat, and supplements such as vegetables had to be bought out of wages. Trowell criticizes this system, since abandoned, and says :—" everything suggests that Africans can arrange their own diet much better than has been arranged for them by Europeans in institutions or by any system of rations."

By supplementing the ration the workers were achieving an adequate, or nearly adequate, diet. This, however, is not the whole story. Clinical and pathological studies have shown that the syndrome called by Trowell " malignant malnutrition " is very common in East Africa. It is characteristic of this disease that its effects are widespread throughout the body, and they are permanent. Thus, in considering the causes of inefficiency and ill-health in Africans, it is necessary to take account of the past as well as the present, of the previous dietary background and of old injuries resulting therefrom. " Almost the whole of the medical report must, therefore, turn on the evaluation of malignant malnutrition."

The African child is handicapped in his development before, during, and after birth. It is only during 6 months of breast-feeding that " for one brief period in his life he achieves parity ". Thereafter he passes through a phase of malnutrition which damages many internal organs to an extent which we cannot assess by present techniques. Not only the body but the developing mind as well may be injured. " The whole weight of the clinical and pathological evidence supports the contention that many, if not the majority of Africans have suffered and may still suffer from a disease which has left not only scarred and crippled internal organs but scarred and crippled mental attitudes and reactions ". Hence the apathy and lack of initiative so often noted in African adults. The vicious circle is established of low work, low wages, malnutrition, poor living conditions.

ii. In the second paper, are given the results of the clinical examination for signs of malnutrition. For the general reader, the interest will probably lie not so much in the findings themselves, as in the discussion of diagnostic criteria, and of the difficulties encountered in nutritional surveys. In particular, there is a detailed description of " crackled skin " or " mosaic skin ", and of the points which differentiate it from " crazy-pavement dermatosis ".

The results are classified under two headings :—recognized and doubtful signs of malnutrition There was no clear-cut evidence of calorie or protein deficiency. More than a third of the subjects showed alterations in the conjunctiva—thickening, pigmentation, vascularization, and dryness. In three per cent., foam-like plaques were present as well; these cases were classified as xerophthalmia: 38 per cent. of the employees had follicular keratosis of varying degree, and in 24 per cent. there was xerosis of the skin. These skin and conjunctival changes are listed under the heading of vitamin A deficiency. There was no evidence of vitamin B_1 deficiency. Signs of aribo-flavinosis were uncommon, cheilosis being present in two per cent., and corneal vascularization in three per cent. In a few subjects there were mild changes in the tongue attributed to nicotinic acid deficiency, such as swelling, localized bare areas, redness and hypertrophy of papillae. Classical pellagra was not

seen, and there were no cases of scurvy. Parodontal disease and non-scorbutic gingivitis were, however, common. There was no evidence of rickets; no proven case of rickets has in fact ever been found in an African in East Africa. The iron intake was adequate, since the diet consisted largely of maize, and there was no clinical evidence of anaemia. Although the calcium content of the ration was low, there were no clinically apparent effects of calcium deficiency. Active dental caries was present in only six per cent.

The remaining sections are devoted to signs of uncertain origin, which were found as follows :—

Hair—loss of texture	12	per cent.
Hair—loss of texture and some loss of colour ...	4	,,
Crackled skin (all grades)	42	,,
Enlargement of the liver	2	,,
Gynaecomastia	5	,,
Parotid enlargement, moderate or marked ...	18	,,

A technique is described for detecting and estimating the degree of parotid swelling.

[It is to be hoped that the introductory paper will in fact be read outside purely medical circles for the problems discussed in it with clarity and force are important not only to doctors. The emphasis on the psychological results of malnutrition is welcome. We are no longer concerned only with frank deficiency disease, but more and more with suboptimal health, in which the physical signs may in themselves be insignificant. They serve, however, as clues, pointing to disabilities that we cannot yet assess. During the war some work was done on the relation of nutrition to performance and behaviour (Franklin, Schiele, Brozek, & Keys, (1948) *J. Clin. Psychol.* v. 4, 28) but only the surface of the field has been scratched.

Trowell implies that malnutrition is the point at which to attack the vicious circle of low work, low wages, low food. The challenge is not lightly made, for he goes on to say of malignant malnutrition that the cause is unknown, the prevention uncertain, the cure often impossible. The disease is not to be explained by current nutritional concepts, with many of which it is in sharp conflict.

The second paper illustrates the incompleteness of our knowledge in a different way. A severe critic might argue that almost every one of the positive findings recorded in the survey should be listed under the heading "of uncertain origin". For instance, not all workers would agree that the conjunctival changes described are caused by vitamin A deficiency. Kruse [see *Bulletin of Hygiene*, 1942, v. 17, 115] believes that they are, but Platt prefers to use the non-committal term "excess tissue" [*ibid.*, 1945, v. 20, 412]. The literature suggests that the clinical appearance is not identical with xerophthalmia in the Far East, and there are differences in natural history. "Excess tissue" never goes on to keratomalacia, it is less common in the young, and more common with pterygium, which in Europe is regarded as a senile change. Whatever the origin of "excess tissue", it seems to be an example of the generalization, that the effects of malnutrition mimic those of senility. The question now arises, is this true also in the psychological sphere ?]

J. C. Waterlow

Altmann, A. & Murray, J. F. **The Anaemia of Malignant Malnutrition (Infantile Pellagra, Kwashiorkor): Protein Deficiency as a possible Aetiological Factor.** *South African J. Med. Sci.* 1948, June, v. 13, No. 3, 91–113, 8 figs. (4 on 1 pl.). [80 refs.]

Haematological investigations were carried out between October 1946 and January 1948, in the Johannesburg non-European Hospital, upon 34 children

suffering from gross nutritional disorders. Thirty-one of the cases were typical of the "malignant malnutrition" syndrome with oedema, rash, mucous membrane and hair changes; the remainder were cases of uncomplicated nutritional oedema.

Anaemia was found in all, but was of only moderate degree even in those who were very severely ill. It was mostly normocytic in type (26 out of 34 cases): 4 of the children had a microcytic blood picture while 3 were macrocytic; a fourth became macrocytic while under observation.

Only 6 of the 17 bone marrow specimens examined showed abnormal cells suggestive of the megaloblastic anaemia associated with lack of liver principle or folic acid, and of these only 2 occurred in cases with macrocytic anaemia. The abnormal marrow cells were of intermediate type rather than typical megaloblasts and even when present they were never predominant.

Treatment consisted almost entirely of dietary improvement; skim lactic acid milk was used. This induced a reticulocyte response in 9 cases: clinical response was rapid and satisfactory.

During the early part of the recovery phase there was frequently a drop in haemoglobin level and in red cell count, which is interpreted as being due to an early rise in plasma volume, outstripping the rate of regeneration of red cells and haemoglobin.

On the basis of their findings, the authors conclude that the normocytic anaemia in these cases is due to deficiency either of total protein or of some specific amino-acid, possibly tryptophane; and that the anaemia, together with lowered plasma volume, represents a disturbance of blood regeneration due to lack of essential blood-forming materials. The occurrence of hypochromic or megaloblastic anaemias, indicative of deficiency of iron and liver principle respectively, is due to the presence of complicating factors or associated deficiencies, in much the same way as skin lesions and lesions of mucocutaneous junctions can be regarded as being due to associated vitamin deficiencies and not as a fundamental part of the protein imbalance picture. [See WATERLOW, this *Bulletin*, 1948, v. 45, 724.] *Dean A. Smith*

KRUMDIECK, C. F. & PUGLISEVICH, J. M. Estudios acerca de la distrofia en los niños de Lima (Peru). [**Studies on Infantile Malnutrition in Lima, Peru.**] *Rev. Hospital del Nino.* Lima. 1947, Sept.–Dec., v. 9, Nos. 32/33, 217–35, 11 figs. on 6 pls.

Ninety per cent. of the infants and children less than five years old, admitted for various causes to the children's hospital in Lima, were below normal weight. The weight-deficit became more frequent and more severe with increasing age. A quarter of the babies were 40 per cent. or more below weight, and a quarter of the children between two and five showed signs of multiple vitamin deficiency. This high incidence of malnutrition results from social factors—poverty, illiteracy, overcrowding, or desertion by one or other parent.

In 10 malnourished babies, a special investigation was made of the pathological physiology of the liver. Unfortunately, no clinical data are given in this paper. There was a normocytic anaemia of moderate severity, with little or no leucocytosis. The serum protein concentration ranged from 5·1 to 6·6 gm. per cent., with an albumin : globulin ratio of 1 to 1·9. There was a slight increase in serum bilirubin, and a reduction in serum cholesterol. Three liver function tests were made: the Manger cephalin-cholesteral test was positive in all ten cases, bromsulphthalein retention was found in one case only. In most of the babies there was impairment of glucose tolerance, with raised blood-sugar levels persisting after two hours [see HOLMES & TROWELL, this *Bulletin*, 1948, v. 45, 726].

Biopsies of the liver were made in four cases. In all there was cellular infiltration of the portal spaces, with varying degrees of fatty change and vacuolation of the liver cells. There was some thickening of the walls of the portal vessels. The bile-ducts were normal. In one case, connective tissue fibres from the portal tracts were infiltrating the parenchyma, cutting up the lobules. *J. C. Waterlow*

FERNANDO, P. B., MEDONZA, O. R. & RAJASURIYA, P. K. **Cirrhosis of the Liver in Ceylon and its relation to Diet. A Review of 102 Cases.** *Lancet.* 1948, Aug. 7, 205–11, 9 figs. [17 refs.]

The cases described are divided into two groups on the basis of clinical history and the appearance of the liver at necropsy or biopsy. Fifteen cases were classified as toxic cirrhosis. In 12 of these there was a history of an illness, characterized by jaundice and biliuria, preceding the onset of cirrhosis. On admission to hospital, ascites was present in all 15, oedema in 12, and splenomegaly in 3. van den Bergh and Takata-Ara tests were positive ; hippuric acid excretion was reduced, in several cases to less than 25 per cent. of normal. The plasma albumin concentration was low, and the albumin : globulin ratio was reversed. Four patients were discharged apparently cured ; in six others the diagnosis of toxic cirrhosis was confirmed by biopsy or post-mortem examination. The liver was coarsely nodular ; microscopically there were collections of hyperplastic liver cells, without normal lobular structure, and separated by areas of scar tissue containing numerous bile-ducts.

The remaining 87 cases were classified as Laennec's cirrhosis, and further divided into 3 sub-groups, according to the stage of development of the disease. In the earliest stage, the only constant clinical finding was great enlargement of the liver, the edge being 3 finger-breadths or more below the costal margin. In most cases of this sub-group the diagnosis was confirmed by biopsy. As the disease developed, ascites became more common, and oedema, splenomegaly, and haematemesis were also found. In the final stage the liver was contracted and no longer palpable. There was no clinical jaundice in this group, and bile-pigment was only occasionally found in the urine. In half the cases, however, there was a positive van den Bergh reaction, and in nearly half an increased urobilinuria. Even in the early stages the Takata-Ara test was positive, and hippuric acid excretion reduced. The plasma proteins showed the changes characteristic of liver dysfunction—a reduction in albumin and an increase in globulin. Anaemia was present, sometimes macrocytic, and spherocytosis was also found in a few cases. At autopsy in patients of this group the liver was finely nodular. Microscopically there was a fine fibrosis affecting particularly the portal regions, and breaking the lobules up into small groups of cells. In the early stages the fibrosis was accompanied by extensive fatty infiltration.

Much attention has been devoted in recent years to malnutrition as a possible cause of cirrhosis of the liver in the tropics. For this reason the dietary history was investigated in as many cases as possible. In the first main group, the diet was considered to be adequate in 8 cases, and in these the cirrhosis was regarded as a sequel to infective hepatitis. In 6 others the diet was deficient, particularly in protein, and the authors comment that " it looked as if the experiments of HIMSWORTH and GLYNN [see *Bulletin of Hygiene*, 1944, v. 19, 584] had been reproduced unwittingly ".

In the group of Laennec's cirrhosis a detailed dietary history was available in 43 cases. The diets were classified, from good to bad, as A, B, C, D. The distribution of the diets among the patients, and in 400 non-cirrhotic controls, is shown in the accompanying table.

Diet	In patients with Cirrhosis, per cent.	In controls, per cent.
A	37	64·5
B	9	22
C	23	5·25
D	30	8·25
No. of cases	43	400

About four times as many cirrhotics as controls fall into groups C and D. It is noteworthy also that all the cases of early cirrhosis with fatty infiltration of the liver, from whom a history was available, fell into category D.

These results are discussed in the light of recent experimental work on dietary liver damage, and it is concluded that in these cases cirrhosis of the Laennec type was preceded by fatty infiltration, caused by a diet deficient in animal protein and lipotropic factors. In some cases alcoholism may also play a part, since it was commoner among the cirrhotics than in the control series.

[It is impossible in an abstract to do justice to this valuable paper, which contains many details that have not been mentioned here, and is illustrated by excellent photomicrographs. There is a close parallelism between these clinical findings, and the two types of dietary liver injury produced experimentally by HIMSWORTH and GLYNN [*loc. cit.*]. On closer examination, however, the rôle of malnutrition as a cause of toxic cirrhosis, in the cases described above, appears open to question. For if, out of the 15 patients, there were 8 who were well-nourished, and were diagnosed as having infective hepatitis, why should not the 6 ill-nourished also have had infective hepatitis? The evidence, in fact, rests on two points: 6 cases out of 15 with a history of bad diet is a higher proportion than in the control series. Secondly, in several of the cases the diet had been rather severely restricted for a relatively short period before the onset of jaundice. Neither of these points is conclusive in such a short series.

The evidence, on the other hand, for a relation between malnutrition and diffuse fibrosis, is impressive, and is the first of its kind. Hitherto nothing more positive has been established than a general correlation between the incidence of cirrhosis and of malnutrition.] *J. C. Waterlow*

i. NITZULESCU, J. Etat actuel des recherches sur la pellagre en Roumanie. [**Present Position of Pellagra Studies in Rumania.**] *Bull. Acad. Méd. Roumanie.* 1947, v. 20, Nos. 1/2, 25–36. [19 refs.]

ii. ——. Esquisse d'un programme d'étude et de lutte contre la pellagre en Roumanie. [**Outline of a Campaign against Pellagra in Rumania.**] *Ibid.* 202–9.

i. Pellagra is still one of the most serious endemic diseases in Rumania. In 1945, for instance, 10,302 cases were recorded as attending hospitals and clinics, and it is thought that in 1938 the actual incidence was probably in the region of 110,000 cases. There were in that year over 3,000 deaths.

In this paper pellagra is taken to mean multiple deficiency in which symmetrical photosensitive dermatosis predominated. The symptomatology followed mainly the classical triad, but showed great variability in severity of

different symptom groups. No pathognomonic biochemical changes were discovered; nicotinic acid excretion was diminished in some cases, but this was inconstant.

The highest incidence of the disease occurs in Moldavia where the diet of country folk contains an excessive proportion of maize and is deficient in protein [see BORROW *et al.* this *Bulletin*, 1948, v. 45, 729].

Nicotinic acid has been found of the greatest use in treating the classically pellagrous part of the syndrome, but has to be accompanied by an all-round improvement of diet to clear up the whole deficiency state.

ii. In his second paper, the author appeals for a concerted attack on the pellagra problem in Rumania. He emphasizes the necessity for field investigations to determine the full dietary pattern of the inhabitants of the areas where pellagra is endemic and the natural history of the disease.

While clinical and laboratory studies are of the greatest importance, this social scourge can ultimately be eliminated only by reforming the whole pattern of rural economy and diet. Among the measures proposed for this purpose are demonstration farms, co-operatives, domestic science schools, canteens and model bakeries. *Dean A. Smith*

RAMALINGASWAMI, V., MENON, P. S. & VENKATACHALAM, P. S. **Infantile Pellagra. Report on Five Cases.** *Indian Physician.* 1948, Sept., v. 7, No. 9, 229–37, 7 figs. on 2 pls. [27 refs.]

These five babies presented all the typical features of infantile pellagra or kwashiorkor. They came from families of the labouring class, whose diet is known to be deficient, and among whom malnutrition is prevalent. The age at admission ranged from 6 months to 3 years. The main clinical features were dryness of the hair, angular stomatitis and blepharospasm, oedema, enlargement of the liver, and lesions of the skin. These are illustrated in several photographs, and appear to fulfil the criteria laid down by TROWELL [this *Bulletin*, 1941, v. 38, 722] for "crazy-pavement" dermatosis in Africa. The lesions consisted of pale desquamated areas surrounded by a zone of hyperpigmentation, and were found in the popliteal and antecubital fossae, in the groins, on the vulva, and on the buttocks. There was a history of diarrhoea in all the cases; examination of the stools showed nothing abnormal except for fat globules, and in one case blood and mucus.

Treatment was unsuccessful; in spite of a high protein diet, supplemented with riboflavin, thiamin, and nicotinamide by injection, all the babies died. Permission was not given for post-mortem examination.

[Three points are of interest in this paper. In the first place the report of HARE (*ibid.*, 1947, v. 44, 738), is confirmed, that kwashiorkor does in fact occur in India. The question, however, still remains, whether it is as common as in Africa, and if not, why not? Secondly, although it is difficult to judge from so small a series, the exceptionally high mortality supports the belief of GILLMAN and GILLMAN (*ibid.*, 118) and of MAGALHÃES CARVALHO (*ibid.*, 1948, v. 45, 635) that pure vitamins do no good, and may in fact do harm. Thirdly, an unusual feature is that most of the babies were still on the breast at the time when symptoms first appeared—more commonly the disease does not begin until after weaning.] *J. C. Waterlow*

VIEIRA, J. R. Comentário sôbre o estudo da pelagra. [**Comment on the Study of Pellagra.**] *Anais Paulist. de Med. e Cirurg.* 1946, June, v. 51, No. 6, 399–410.

This is a general résumé of the subject with special note on the disease in Recife and a few other towns in São Paulo. The whole is a fair sketch of the

main features of pellagra, its history, the different theories as to causation, its symptoms and pathology, and in general terms the results of treatment by dieting and the giving of nicotinic acid and nicotinamide, 1 gm. orally and 3 gm. intramuscularly as a daily dose.

In Recife itself during the period 1940–43, there are records of 25 women and 28 men patients; in 34 other towns a total of 24 women and 38 men, altogether 115. The age of one man was not known; of the others in succeeding decades from the second to the ninth there were 2, 21, 26, 30, 17, 11, 5 and 2, practically half the total in the 30–50-year group. Information obtained by following up the cases [for how long ?] showed that of the 66 males 41 had died, 16 were cured, 2 had improved, while 7 were unchanged; of the 49 females 36 had died and 13 were cured. *H. Harold Scott*

MAINZER, F. **The Pellagra-Electrocardiogram and its Significance.** *Acta Med. Scandinavica.* 1948, Sept. 15, v. 131, No. 3, 269–87, 3 figs. [31 refs.]

Non-specific changes in the electrocardiogram have been described in pellagra by RACHMILEWITZ and BRAUN (*Brit. Heart J.*, 1945, v. 7, 72). The most common are depression of the S-T interval and abnormalities of the T wave (T flat, isoelectric, or negative). In the present paper, studies are reported on 45 pellagrins. Abnormal or borderline ECG bindings were observed in 35 cases; they are thus a common concomitant of pellagra, as frequent as any other single lesion such as dermatosis, diarrhoea, or glossitis. The proof that these ECG changes are caused by pellagra rests on the exclusion of other causes and on the response to treatment with nicotinic acid. There was, however, no relation between the presence or intensity of cardiographic changes, and the duration, intensity, or predominant localization of the pellagrous lesions.

In general, a parallelism was found between the course of the disease and of the changes in ECG, although there were many exceptions: sometimes the cardiogram became worse during clinical cure, and sometimes it improved even when the pellagra ended fatally. In more than half the patients, the ECG became normal or improved on treatment with nicotinic acid. In some cases there was further improvement when thiamin or yeast was given as well.

In the discussion it is suggested that failure to respond to treatment may result from irreversible damage to the heart-muscle. Several factors may account for the variability of the ECG changes, and the lack of any close correlation with the other manifestations of pellagra. These are: variations in the rate of nicotinic acid depletion, and interactions with other vitamin deficiencies, some of which may enhance, and others inhibit, the progress of myocardial damage. *J. C. Waterlow*

DOXIADES, T. & TILIAKOS, M. Die "Schwarze Haarzunge" (Black Tongue) als Mangelerscheinung bei Menschen. [**Black Tongue as a Deficiency Symptom in Man.**] *Schweiz. med. Woch.* 1948, Oct. 23, v. 78, No. 42, 1041–2, 3 figs. [12 refs.]

"Black tongue" of dogs—the analogue of human pellagra—is not seen in human pellagrins, but the so-called "Hairy tongue" occurs with, or without, the usual signs of pellagra. The author records four cases of this condition; three recovered on being given nicotinic acid, the fourth, who suffered from diplegia and pernicious anaemia as well as "hairy tongue," died. The author argues that in favour of there being some connexion between the "hairy tongue" and pellagra in man and the "black tongue" of dogs are the facts that, in the cases here recorded, good results followed the administration of

nicotinamide plus vitamin B complex, that in all there was a basal B-avitaminosis, and that the condition developed in the spring. On the other hand, it is acknowledged that up to the present black tongue has not been observed in pellagra nor in times of epidemics, nor has it been produced in experimental pellagra in man, and that it was not recorded in the severe hunger epidemic of 1941–42 in Greece. He concludes with the remark that distinction must be made between acute and chronic deficiency and that it is in the latter that "black tongue" occurs. *H. Harold Scott*

HAEMATOLOGY

SCHWEIGERT, B. S., with the technical assistance of Frances PANZER & Patricia SPARKS. **Folic Acid Metabolism Studies. III. Intravenous Administration of Pteroylglutamic Acid and Pteroyltriglutamic Acid.** *J. Lab. & Clin. Med.* 1948, Oct., v. 33, No. 10, 1271–5, 2 figs. [14 refs.]

BERK, L., BAUER, J. L. & CASTLE, W. B. **Folic Acid. A Report of 12 Patients treated with Synthetic Pteroylglutamic Acid with comments on the Pertinent Literature.** *South African Med. J.* 1948, Oct. 9, v. 22, No. 19, 604–11, 7 figs. [21 refs.]

Twelve cases of pernicious anaemia have been treated with synthetic pteroylglutamic acid in Boston, Mass. The plan of dosage was 10 mgm. intramuscularly daily during the initial stages of the response, during which time the diet was devoid of haematopoietically active substances. This was followed by maintenance with 75 mgm. intramuscularly once a week. The reticulocyte responses and initial rises in red cell count and haemoglobin were entirely comparable with those seen with purified liver extract therapy. Four patients were studied during ten days to two months of therapy: in three, treatment was continued and complete remission observed. Four showed failure of the blood values to return to normal; this was attributable in two cases to inadequate amount of therapy, and in another to concomitant iron deficiency. Two patients on constant folic acid dosage showed a decline below normal in their blood values after a normal status had been maintained for four and five months respectively. In both, normal blood values were restored by intramuscular injections of purified liver extract.

Neurological manifestations developed for the first time or progressed in one of the five treated with 75 mgm. of folic acid intramuscularly weekly from eight to 17 months, but also in two others who had received 50 mgm. of folic acid daily by mouth for 6–11 months respectively.

The haematological responses and prompt general clinical improvement following the use of folic acid in pernicious anaemia and related macrocytic anaemias closely resemble the results of liver extract therapy. In some patients, however, development of glossitis and failure to maintain a normal blood picture have been observed under folic acid therapy. In view of the considerable incidence of neurological manifestations in cases of pernicious anaemia maintained on it, folic acid should probably not be used therapeutically in this condition until the nature of this undesirable effect is better known. *P. Manson-Bahr*

MEYER, L. M. **Neurologic Sequelae in Macrocytic Anemia of Gastrointestinal Origin following Folic Acid Therapy.** *Amer. J. Clin. Path.* 1948, Oct., v. 18, No. 10, 811–14, 1 fig. [12 refs.]

"A patient with macrocytic hyperchromic anemia, attributable to faulty intestinal absorption, was successfully treated with liver extract to which he

became sensitive. Treatment with folic acid for thirteen months was followed by the development of peripheral neuritis and combined system disease. Successful desensitization to liver extract and treatment with this drug resulted in complete remission of the neurologic disease and return to health."

PATEL, J. C. **Crystalline Anti-Pernicious-Anaemia Factor in Treatment of Two Cases of Tropical Macrocytic Anaemia.** *Brit. Med. J.* 1948, Nov. 27, 934–5. [11 refs.]

"Two cases of tropical macrocytic anaemia showed good responses to treatment with 80 μg. of Lester Smith's crystalline anti-pernicious-anaemia factor."

DERMATOLOGY AND FUNGUS DISEASES

LEON, L. A. El carate o mal del Pinto en los niños. [**Mal del Pinto in Children.**] Publicaciones del Ministerio de Previsión Social, Quito, Ecuador. 1944, 27 pp., 8 figs. [13 refs.]

This brochure was presented at a Medical Congress held in Quito, Ecuador, in 1942, was published two years later, but was not received here until October 1948. The information it contains was well up to date at the time but contains little that is not common knowledge now. Pinta, in Ecuador at least, is far more common in children than is generally believed. In the State of Guerrero, of 1,535 patients 638 (47 per cent.) were under 10 years of age. HEREJÓN recorded 259 of 683 (37 per cent.) from various Mexican States, and the present author found 35 out of 100 cases in Los Chillos Valley to be in children under 10 years. It is estimated that more than half (53 per cent.) of the patients are below 15 years of age. The causes for this preponderance among the young are stated to be, first, that the children are out in the fields and are attacked by flies and mosquitoes; second, that their skin is delicate and largely unprotected, especially the arms and legs; third, that they suffer from small lesions, scratches, erosions and the like; and, fourth, that they are the chief victims of other dermatoses, scabies, impetigo, etc.

The author gives the geographical distribution of the disease in inter-tropical America. The chief endemic zones are in Mexico, Colombia, Venezuela, Ecuador, Brazil, Peru and Porto Rico, but cases are also met with in El Salvador, Guatemala, Honduras, Panamá, Bolivia and Argentina. In Ecuador itself there are four "pintogenic zones": (1) The valley of Los Chillos in the province of Pichincha; (2) the valley of Catamayo, Loja province; (3) Santa Rosa de Machala, El Oro province; and (4) several foci in the province of Napo-Pastaza. In six other provinces, namely, Santiago-Zamora, Esmeraldas, Manabí, Los Rios, Tungurahua and Azuay, cases have been seen.

The remainder of the article is concerned with the aetiology, symptomatology, course, pathological anatomy, diagnosis, prognosis, treatment both curative and prophylactic, and does not call for detailed notice here. *H. Harold Scott*

SALVIN, S. B. & HOTTLE, G. A. **Serologic Studies on Antigens from *Histoplasma capsulatum* Darling.** *J. Immunology.* 1948, Sept., v. 60, No. 1, 57–66, 3 figs. [23 refs.]

To determine the best antigenic preparation for the detection of antibodies to *Histoplasma capsulatum* in serum, by the complement-fixation and precipitation tests, the authors investigated seven different *H. capsulatum* antigen

preparations, using the sera of experimentally infected rabbits. The antigens used were: (1) A suspension of intact, formolized yeast-form cells; (2) the filtrate of liquid obtained by grinding up a mass of washed, yeast-form cells; (3) the solid residue left after filtration for 2; (4) the filtrate of a broth culture in the yeast form; (5) the filtrate from grinding up a mycelial mat in saline; (6) the solid residue left from filtration for 5; (7) the filtrate of a broth culture in the mycelial form. It will be noticed that 2, 4, 5 and 7 are soluble antigens and 1, 3 and 6 are particulate. Numbers 1, 2, 3 and 4 are derived from the yeast form of the fungus and 5, 6 and 7 from the mycelial form. All seven antigens were immunologically similar, but the particulate preparations seemed to contain at least one antigenic factor not present in the filtrates; a difference demonstrable by antibody absorption.

Precipitation tests with the four soluble antigens gave positive results with rabbit sera drawn up to about six weeks after infection, and reactions at the highest titres occurred with sera drawn when the animals were clinically ill. The strongest reactions were given with the mycelial broth culture filtrate (No. 7). These tests gave negative results with sera drawn 8 to 10 weeks after infection. On the other hand, complement-fixation tests with the particulate yeast antigen (No. 1) gave the strongest reactions with sera drawn five weeks after infection, but the reaction persisted at a lower titre for at least six months, which demonstrates the value of this test in the diagnosis of chronic infection.

J. T. Duncan

Negroni, P., Daglio, C. A. N. & Briz de Negroni, C. Estudios sobre el "Coccidioides immitis" Rixford y Gilchrist V. [**Studies on** *Coccidioides immitis*.] *Prensa Méd. Argentina.* 1948, Aug. 20, v. 35, No. 34, 1652.

After a case of generalized coccidioidomycosis had been reported in the Rio Colorado area (Río Negro Territory, Argentina) a survey was made to ascertain the probable incidence of the disease in the country.

Intradermal tests with 1/100 standard coccidioidin were made on 2,065 primary school children, boys and girls, between the ages of 6 and 15, in 7 stated areas. Complete results were available in 1,834 children and are shown as percentage findings of positive and doubtful reactions. [It is stated that results were read after 24 hours, but what was the criterion of a "doubtful" reaction is not stated.]

The positive results varied from 1 to 10·26 per cent. and the "doubtful" from 1·66 to 5·63 per cent. The high positive figure of 10·26 per cent. was found in the Río Colorado area. The highest "doubtful" result (5·63) was in Neuquén. It is noted that most of the positive reactions in the Río Colorado area were ++ or +++ and that a symptomatic case was seen. No correlation was noted between positive findings and sex, but there was a peak of incidence between the ages of 10 and 11.

It is added that one member of the Commission developed a positive coccidioidin reaction and mild bronchitis 15 days after his arrival in Río Negro, which is taken to confirm the "endemic character of the zone investigated". This zone corresponded to the dry regions and the authors recommend soil irrigation as one means of limiting the dangers of endemic coccidioidomycosis.

H. J. O'D. Burke-Gaffney

Gunche, F. F., Radice, J. C. & Feoli, L. S. J. Blastomicosis primitiva de boca (Paracoccidiode brasiliensis). [**Buccal Blastomycosis** (*Paracoccidioides brasiliensis*).] *Semana Méd.* 1948, Oct. 21, v. 55, No. 43, 866–9, 7 figs.

Report of a case.

QUIROGA, M. I., NEGRONI, P. & CORDERO, A. A. Resultados de la terapéutica sulfamídica asociada a la vacunoterapia específica en cuatro nuevas observaciones de blastomicosis sudamericana. [**Results of Sulphonamide Therapy associated with Specific Vaccino-therapy in Four New Observations of South American Blastomycosis.**] *Rev. Argentina Dermatosifilologia.* 1947, July–Dec., v. 31, Nos. 3/4, 566–72, 4 figs. [23 refs.]

The South American type of blastomycosis (paracoccidioidal granuloma) was formerly believed to be incurable, but encouraging results from the treatment of the disease with the sulphonamides have been reported recently.

The present paper records the clinical cure of four cases by means of the combined treatment with intravenous injections of " solutiazamida " [a preparation of sulphathiazole] 1 gm. daily with weekly intermissions, sulphathiazole 3 gm. daily and a vaccine of *Paracoccidioides brasiliensis* given subcutaneously in increasing doses. Supplementary treatment took the form of intramuscular injections of liver extract and vitamins B and C, and local medication of the lesions with sulphonamide pomade alternating with sulphathiazole powder. The first patient, an Argentinian journalist aged 53, who had muco-cutaneous lesions in the mouth and nose and other ulcerating lesions on the cheek and heel with associated lymphadenopathy as well as evidences of involvement of the lungs, was clinically cured in three months, during which time he received 71 injections of " solutiazamida", 231 gm. of sulphathiazole 20 injections of *Paracoccidioides* vaccine and some blood transfusions. The other three patients, all males, aged 45, 37 and 47 years respectively received the same kind of treatment and showed similar rapid recoveries. It is noteworthy that one of the three was a syphilitic who had been under treatment for this disease with arsenic and bismuth and had received 3 million units of penicillin with little apparent effect on the blastomycotic lesions.

Brief clinical descriptions of all the cases are given, and the authors mention the use of the " coccidioidin " skin sensitivity test in one case with a positive result ; presumably, paracoccidioidin was meant.

An interesting observation was the apparently long incubation periods of 22 years and 26 years respectively in two of the cases, as judged by the interval between the presumed time of exposure to infection and the discovery of muco-cutaneous lesions. *J. T. Duncan*

HEAT STROKE AND ALLIED CONDITIONS

LADELL, W. S. S. **The Measurement of Chloride Losses in the Sweat.** *J. Physiology.* 1948, Sept. 30, v. 107, No. 4, 465–71, 2 figs. [15 refs.]

This paper reports the results of direct measurements of salt losses during exercise in hot environments, and compares these with the losses as calculated from the chloride samples obtained over the same period from the whole arm. Sixteen experiments were done on seven subjects.

The classical studies of salt loss during sweating were based on the recovery of all the sweat produced. That method, though accurate, is cumbersome and not generally applicable. It has been reported earlier by other workers that the chloride content of the sweat varies according to the part of the body from which it comes. The present results show that in humid heat, if the whole arm is enclosed, the sweat collected from the arm has the same chloride content as the mixture of sweats from all parts of the body. It is concluded that this finding does not indicate that the chloride concentration in sweat is the same

for all parts of the body, but is probably a chance effect due to the difference in concentration of sweat from different parts of the arm and hand, and to the modifying effect of total enclosure.

Although the experiments were only carried out in hot humid climates, it is thought that sweat samples from enclosed arms are equally good as an indication of the whole body sweat in hot dry environments. *Thomas Bedford*

MISCELLANEOUS DISEASES

RAPER, A. B. **Pigmentation of the Tongue.** *East African Med. J.* 1948, June, v. 25, No. 6, 245–50. [10 refs.]

Pigmentation of the tongue is very common in the African. It takes several forms. Most commonly there are brown or inky-blue spots, formed by deposits of pigment in the fungiform papillae. Sometimes these are accompanied by diffusely pigmented plaques, which are brown, slaty-grey, or lilac-coloured. Tongues with inky-blue spots, and those with diffuse lilac pigmentation are grouped together as " blue " tongues.

Microscopic examination showed that the pigment in all cases was melanin ; no iron-containing pigment was found. The melanin was located in chromophore cells lying in the corium, just beneath the epidermis. Only a few such cells were found in the deeper layers of the dermis. In two cases with diffuse lilac pigmentation there were widely dilated capillaries in the dermis, with branches running up into the cores of the fungiform papillae. This recalled the capillary dilatation found in the tongue in ariboflavinosis, and in experimental black-tongue in dogs. It therefore seemed probable that blueness was caused by capillary dilatation and stasis. To test this, " blue " tongues were compressed with a glass slide, whereupon the blue colour disappeared. Compression of brown or slaty-grey tongues caused no change of colour.

The remainder of the paper is concerned with the significance of pigmentation in the tongue. From an earlier survey of African soldiers it was concluded that pigmentation, and particularly blue pigmentation, was definitely related to malnutrition. This theory has been tested by a further survey of 500 African labourers. The nutritional status was estimated clinically, and the subjects classed in 3 groups—satisfactory, poor, and bad. The overall incidence of pigmented tongues was 42 per cent., and of " blue " tongues 10 per cent. The incidence was the same in all three groups. The original theory of a relation to malnutrition was therefore not confirmed. Only the minority of cases with capillary dilatation can justifiably be attributed to dietary deficiency.

The author believes that pigmentation of the tongue is related not to nutrition but to skin colour. This could not be tested in the survey, because the subjects had rather uniformly dark skins. He discusses, but dismisses, the possibility of a relation to Addison's disease, and points out how little is known about the physiology of pigmentation in general. In the African, pigment may be found not only in the skin and mucosae, but also in deep-seated membranes, such as the arachnoid and the epithelium of the gut. *J. C. Waterlow*

LOPEZ BUSTOS, C. Posibles interpretaciones bioquímicas del latirismo. [**The Possible Biochemical Causes of Lathyrism.**] *Rev. Sanidad e Hig. Pública.* Madrid. 1946, Oct., v. 20, No. 10, 1027–45. [35 refs.]

The author has done much work on the chemical analysis of the vetches—the proteins, prolamines, albumins, globulins, glutelines, the nucleinic acids, the phosphatids, lecithins, the starch, amylose and amylopectin, and the

colouring matter. Minute details of these analyses and the results are presented in this paper; those interested must consult the original, for they are too detailed for reference here.

The discussion as to the possible connexion between these findings and the symptoms of lathyrism is largely, if not entirely, hypothetical. It is acknowledged that vegetal phospholipids, though not themselves antineuritic, nevertheless retard the appearance of symptoms of avitaminosis. The author considers the nutritional value of the plant and the pyrimidine bases and lathyrism, quoting many references to the literature. He then proceeds to discuss the soil factor, showing that not all vetches are toxic, but only (or chiefly) those grown on certain soils, particularly those containing selenium and he concludes in these words (translated): "We do not think that lathyrism is due to deficiency of amino-acids, although the proteids of the flour are poor in sulphurated amino-acids. . . . The cause of lathyrism may be the toxic action of nucleinic acids or the products of their hydrolysis, while the colouring matter may have a harmful action. . . . There is also the possibility that the toxic symptoms may be due to selenium in combinations analogous to the sulphur of the sulphurated amino-acids."

H. Harold Scott

MAKARI, J. G. **Serial Cephalin Flocculation Curves: their Application in the Study of Tropical Diseases and their relation to a New Resistance Factor.** *J. Trop. Med. & Hyg.* 1948, Jan., v. 51, No. 1, 8–20, 5 figs. & 9 graphs. [17 refs.]

This paper discusses in great detail the experimental approach to and application of serial cephalin flocculation curves in health and disease. It deals in particular with the significance claimed for a "resistance factor" which is discussed at length. To follow the author's arguments on the interpretation of his results, the paper should be consulted in the original.

H. J. O'D. Burke-Gaffney

PROTOZOOLOGY: GENERAL

ANSARI, N. & MINOU, A. Présence de toxoplasmes dans des frottis de conjonctive palpébrale humaine. [**Toxoplasma in Smears from the Human Palpebral Conjunctiva.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 463–4.

A Persian girl of 9 was referred to the eye clinic in Teheran from the school medical service with a provisional diagnosis of trachoma. The only eye lesion found was a very limited granular conjunctivitis on the upper eyelids.

Conjunctival smears showed the presence of crescent- or cigar-shaped elements measuring $4 \times 6\mu$ and $2 \times 4\mu$, isolated or in groups. They were almost entirely free, but in one or two cases the parasites were intracellular. The globular nucleus was central or sub-central, and stained deep red [stain used not specified]. Most forms showed binary fission. The protoplasm was homogeneous and stained deep blue, with a red-staining space around the nucleus.

The authors consider from these features that the parasite must have been a *Toxoplasma* and this diagnosis was confirmed by Dr. DELPY. Clinically, no special features of note were found in the child. Some months before, however, she had suffered from a sharp febrile attack for a fortnight, but this had

resolved spontaneously. No laboratory examinations had been made at that time. All physical, neurological and psychological examinations were completely normal.

The authors conclude that toxoplasmosis may be manifested solely in granulations in the palpebral conjunctiva : that, in addition to the recognized clinical forms, it may exist in a latent form causing those harbouring the parasite to continue to be carriers : and that the presence of toxoplasmosis in Iran helps to confirm the very wide geographical distribution of the disease.

H. J. O'D. Burke-Gaffney

ENTOMOLOGY AND INSECTICIDES : GENERAL

MAUZÉ, J. Apparition de *Cochliomyia hominivorax* en Guadeloupe. [**Appearance of *Cochliomyia hominivorax* in Guadeloupe.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 7/8, 502–4.

The following is a translation of the author's summary :—

For the first time a fly *Cochliomyia hominivorax*, hitherto known only in the New World, has appeared in Guadeloupe where it has proved to be a pest to livestock, as it is in America. Therapeutic trials of applying a product containing at least 15 per cent. DDT have proved to be very effective.

H. J. O'D. Burke-Gaffney

D'ANDRETTA, C., Jr. & D'ANDRETTA, M. V. Espécies neotropicais da família Simuliidae Schiner (Diptera Nematocera). II. *Lutzsimulium cruzi*, n. gen. e n. sp. e nova concepção da nervação das asas dos Simulideos. [**Tropical Species of *Simuliidae*. II. New System for the Wing Venation of *Simuliidae*, with a Description of *Lutzsimulium cruzi*.**] *Mem. Inst. Oswaldo Cruz.* 1947, Sept., v. 45, No. 3, 667–77, 35 figs.

The English summary appended to the paper is as follows :—" A new system for wing venation of *Simuliidae* is proposed. *Lutzsimulium cruzi* n., gen. and n. sp. is described based on a single female and its pupal skin."

LAIRD, M. **Reactions of Mosquitoes to the Aircraft Environment.** Reprinted from *Trans. Roy. Soc. New Zealand.* 1948, Apr., v. 77, Pt. 1, 93–114. [26 refs.] Issued separately as Royal New Zealand Air Force Entomological Bulletin No. 5.

In reviewing the literature on the carriage of insects by aircraft the author found that, so far as mosquitoes were concerned, there was little information on the reactions of these insects to the aircraft environment and on their ability to establish themselves in new surroundings after surviving the journey. In view of the fact that many aircraft, on the way to New Zealand, call at places where they are likely to pick up insect vectors of human diseases, these problems were investigated during 1946 both in aircraft and in the laboratory.

In the main enquiry, *Aëdes notoscriptus* was used, but a few males of *Culex pipiens pallens* were taken on board an aircraft in Japan for study during and after the return flight to New Zealand. The various techniques are described and the observations are recorded and discussed. The main reactions to the aircraft environment may be summarized as follows :—

Both sexes of *A. notoscriptus* were sluggish in their movements when exposed to reduced air pressures corresponding to altitudes of 10,000 to 30,000 feet and

they rarely made voluntary flights. At pressures corresponding to those prevailing at 30,000 to 40,000 feet the mosquitoes did not fly at all and seldom made voluntary movements.

Movements were sluggish at 10°C. to 12°C. and voluntary flights became fewer as the temperature fell. The mosquitoes appeared as if dead at temperatures below 3°C., and when maintained at 3°C. to 8°C. for long periods. On being restored to normal air pressure and room temperature (15·5°C.) *Aëdes notoscriptus* rapidly recovered and within ten minutes behaviour appeared to be normal and voluntary flights were made.

Vibration did not significantly shorten the life of the mosquitoes even when so intense as to prevent them resting for periods as long as twenty-four hours at various air pressures and temperatures. Survival in the aircraft was not reduced provided the mosquitoes were able to feed Without food, males were able to survive under all conditions in the laboratory for an average period of four days ; females lived a little longer under the same conditions.

Both *Aëdes notoscriptus* and *C. pipiens pallens* flew about inside their cages in the aircraft in agitated fashion when the motors were opened out just before the take-off ; behaviour returned to normal within five minutes after the plane became airborne. A similar increase in activity was observed when coming in to land.

The male *C. pipiens pallens* brought from Japan lived for an average of six weeks at New Zealand winter temperatures, and it is likely therefore that introduced exotic mosquitoes could become established in the warmer parts of the country.

From this work it is concluded, among other things, that the best time to use insecticidal spraying on board aircraft is immediately before turning into wind for the take-off run. It is suggested that the routine pyrethrum-base aerosol should be sprayed from an automatic system controlled from the cockpit ; and that there should be a supplemental, residual DDT treatment of all enclosed spaces in the aircraft. As a further safeguard, a ground organization should be maintained for carrying out insecticidal spraying in incoming planes, and until the spraying routine has been completed all aircraft arriving from overseas should be required to halt at a designated place on the taxiway before being allowed to proceed to the tarmac for disembarkation of passengers and unloading.

H. S. Leeson

HADDOW, A. J. **The Mosquitoes of Bwamba County, Uganda. VI. Mosquito Breeding in Plant Axils.** *Bull. Entom. Res.* 1948, Aug., v. 39, Pt. 2, 185–212, 2 text figs. & 16 figs. on 8 pls. [16 refs.]

This is an account of a study of plant axils as breeding places for mosquitoes, with special reference to *Aëdes simpsoni*, a known vector of yellow fever in Bwamba, Uganda.

Larvae of twelve species of Culicine mosquitoes were found during the survey and it was established that bananas, plantains, colocasias and pineapple were the principal plants concerned. The total number of axils examined was 34,752 of which 14,047 contained water. Mosquito larvae were found in 6,373, so that the potential foci inhabited amounted to 45 per cent. Of the twelve species of Culicines collected, larvae of *Aëdes simpsoni* were most prevalent (10,679) ; larvae of *Culex musarum* numbered 10,040 ; and there were 3,171 larvae of *Uranotaenia ornata* var. *musarum*. Other species occurred in smaller numbers ; only 29 larvae of *Aëdes aegypti* were obtained. A survey of twelve types of plant showed that three of them, wild banana from mountain slopes, *Pandanus* from Semliki Forest and *Colocasia esculentum* from the mountain, yielded no larvae of *Aëdes simpsoni*, though they harboured huge

numbers of other larvae. This is thought to be merely a reflection of the fact that they grow in environments apparently unsuited to this particular mosquito. All other plants yielded *Aëdes simpsoni*, the most important being the colocasia *Xanthosoma sagittifolium*.

A special study was made of the water content of the plant axils, one of the many factors influencing the preference of the mosquitoes for one plant over another. The general conclusion was that in Bwamba the optimum capacity seems to lie between 4 and 8 cc.

A monthly survey of one hundred *X. sagittifolium* was made from March, 1942, to February, 1943. Larvae of eight species of Culicines were collected amounting to 7,217 specimens ; 5,188 of these were *Aëdes simpsoni* (72 per cent.) and 1,082 *U. ornata* var. *musarum* (15 per cent.). There were only 10 *Aëdes aegypti* larvae. During the year the axils dried out once only for a very short period in February, but the larval populations were completely re-established within 10 days of a light shower.

A collection was made of scrapings from 1,000 dry axils, and 4 living larvae were found. These were discarded and the remaining material was placed in bowls of water. By the second and third days, a total of 24 larvae of *Aëdes simpsoni* and 7 of *Harpagomyia taeniarostris* had appeared. The material was discarded after a week as there were no further hatchings.

Temperature readings were taken on seven successive days in a *Xanthosoma* axil and in an adjoining Stevenson screen. The temperature in the axil seemed even more equable than that in the screen, the mean minimum and mean maximum in the axil being 17·5° and 24·5°C. respectively, and in the screen 18° and 27°C.

A study of the mosquito output from plant axils was made by collecting pupae from 10 *X. sagittifolium* daily for a month. There was a constant output of pupae which were collected on 29 of the 30 days. The number of axils fluctuated between 69 and 74 and altogether 108 pupae were collected of which 95 were *Aëdes simpsoni*. From the figures obtained it is estimated that an acre might contain 500 *X. sagittifolium* which could produce 5,000 *Aëdes simpsoni* adults per month, 2,000 of which would be females.

Among the factors tending to reduce the output of adult mosquitoes from plant axils are the presence of the predatory larvae of *Eretmopodites*, an excessive growth of protozoa on the larvae and infection with the fungus *Coelomyces*.

The author concludes with a note on some of the common inhabitants of plant axils other than mosquito larvae. *H. S. Leeson*

REEVES, W. C., BROOKMAN, B. & HAMMON, W. McD. **Studies on the Flight Range of certain *Culex* Mosquitoes, using a Fluorescent-Dye Marker, with Notes on *Culiseta* and *Anopheles*.** *Mosquito News*. 1948, June, v. 8, No. 2, 61–9, 2 figs.

These studies were made in Kern County, California, during 1946 and 1947. The mosquitoes used were *Culex quinquefasciatus* [*fatigans*], *C. tarsalis* and *C. stigmatosoma*. A method of marking was required which would leave the mosquitoes in a condition fit for tests for viruses and for dissection for plasmodia. A fluorescent dye was chosen as the marker and several were tested but on examination of 78,000 field-caught mosquitoes it was found that numerous specimens had natural fluorescent particles on their bodies, though none of these was red. It was therefore decided to use rhodamine-B, which produced a red fluorescence under ultra-violet light. At first, adult mosquitoes were reared from larvae in water which contained small quantities of rhodamine-B but this method was abandoned because of the high mortality of the larvae and the

frequent failure of the dye to carry over into the adult stage. Next, adults were fed on sugar water containing the dye, and though the red colour was visible and was retained for several days, even after death, the difficulty of getting large numbers made this method unsuitable for flight range experiments. The dusting method was finally used and found satisfactory.

The methods of rearing, marking, transporting and releasing the mosquitoes are described in detail. In 1946, of approximately 47,000 marked mosquitoes only 73 were recovered (less than one out of 650 released); in 1947, 23,000 were released and only one recovered out of every 720. It was not intended to determine the maximum range of flight, but to estimate the "effective flight range", which is defined as the maximum distance from its breeding places that a species is able to fly in numbers sufficient to propagate a mosquito-borne disease or to constitute a nuisance.

The results are tabulated and show that in 1946, *C. quinquefasciatus*, *C. tarsalis* and *C. stigmatosoma* had a flight range of at least 2·5, 0·5 and 1·0 miles respectively. In the 1947 trials, the flight range for *C. tarsalis* was extended to 2·5 miles.

It is concluded, therefore, that an extensive breeding place of two of these species of *Culex* located a mile or more outside the boundaries of a controlled area, could serve as an important source of infestation and may even be so in the case of the third species, for under different conditions these mosquitoes may live longer or travel further. At present, however, the authors recommend a tentative practical limit for control measures of not less than 1½ miles beyond the population to be protected.

Incidental to the main study, *Anopheles pseudopunctipennis franciscanus* and *Culiseta incidens* were recovered up to 0·9 and 0·6 miles respectively.

H. S. Leeson

SMITH, E. A. **Aerial Spray Operations in Merced County, California.** *Mosquito News.* 1948, Mar., v. 8, No. 1, 1–8, 4 figs.

In a district of two thousand square miles in California, three-quarters of the land produces mosquitoes, mainly from irrigated pasture and irrigation of a variety of crops. [The reduction and control of the irrigation water is not discussed.] Many species of mosquitoes occur in the area and two species of *Aëdes* are very troublesome, biting by day and night and having a long range of flight.

Control of these insects has been by spraying from the air. Two aeroplanes have been available. One is a Stearman biplane with a single 450 h.p. engine. It carries a 130-gallon tank of spray liquid which can be discharged through a spray boom with eight nozzles; these can be operated in pairs giving a rate of discharge of 7 to 28 gallons per minute. It is also stated that the discharge can be regulated between a half and ten gallons of liquid per acre [if these figures are correct they appear to imply a very great control of flying speed]. The same aeroplane carries a device for producing so-called aerosols made by discharging an insecticidal solution into the exhaust. This device, which is described in detail elsewhere [this *Bulletin*, 1946, v. 43, 1111] permits a discharge from the machine of 1–14 gallons per minute. It is possible to change over from spraying to aerosols while in the air. The second machine, known as an Aeronca, is much smaller, carrying only 35 gallons of spray, which is discharged under pressure through ten nozzles. The output is regulated by a control of the pressure and can be between half and one gallon per acre.

The only insecticide used was DDT, of which several formulations have been tested. All were applied at 0·4 lb. of DDT per acre. [Whether this is measured on the ground or only estimated from the output and whether the figure is for pure DDT is not clear.] The aerosol from the exhaust has been put down at the rate of 0·3 lb. per acre, of actual DDT.

It has been found possible to spray in spite of fairly strong wind and even during the heat of the day, and it is said that spraying has killed all larvae and 95 per cent. of adult *Aëdes*. The droplets are large with a mass median diameter of 150 microns. With the aerosol, the droplets are of a mass median diameter of 50 to 75 microns, and the use of this is only possible in the very early morning before thermal up-currents have been established. The aerosol has given good penetration through trees and tall grasses.

The paper contains a number of details on swathe width and other matters. The ground staff numbered two only, one man to drive the truck and the other to put out signals for the line of flight.

Most spraying was done over flooded pasture so that no serious damage to fish could result. In certain deeper waters, it appeared that the spray killed fish to a considerable extent, but did no ascertainable harm to birds. In one case when 0·8 lb. of DDT per acre was discharged there was an immense destruction of insects of many sorts, some of them certainly beneficial.

If the area to be treated is large, spraying from the air is almost the only possible method and is certainly cheaper than anything one can do from the ground. Valuable figures are given about the performance of the two aeroplanes, the costs and the like. *P. A. Buxton*

SACKTOR, B., HUTCHINSON, M. & GRANETT, P. **Biology of the Lone Star Tick in the Laboratory.** *J. Econom. Entom.* 1948, Apr., v. 41, No. 2, 296–301, 2 figs.

A method is described of maintaining a laboratory colony of ticks, which is a modification of one previously used for rearing *Dermacentor andersoni*. The tick used by the present authors was *Amblyomma americanum* and the host animal was a rabbit. Details of the life history as observed in the laboratory are also recorded.

The ticks were kept in five-inch lengths of glass tubing half an inch in diameter. At the top end these tubes were plugged with cotton wool wrapped in cheesecloth and at the bottom end with a prepared cork.

The cork was first bored through the middle and then one end and the sides were covered with 100-mesh wire cloth. The covered cork was inserted a little way into the bottom of the tube and sealed into position with a few drops of paraffin wax. To provide the necessary humidity inside the tube, one end of a cotton wick was fixed to the cork and the other end was placed in distilled water. In the laboratory, the optimum temperature for *A. americanum* was about 30°C. and a humidity between 85 and 100 per cent. was favourable.

When the ticks were to be transferred from the tubes for feeding on the rabbit, a stream of carbon dioxide was passed through the gauze-covered cork to immobilize them. The cotton wool plug was removed and the ticks were picked out or brushed out into the feeding boxes (" capsules ") cemented to the skin of the animal.

A feeding box was made from a metal pill box, 1·75 inch in diameter. A hole 1·25 inch in diameter was cut in the bottom and a piece of chamois cloth with a hole slightly less than this was cemented to the bottom of the tin ; this was then cemented to the shaved side of the rabbit. In the lid of the tin two quarter-inch holes were cut, one of which was covered with stainless steel wire gauze (100 mesh) soldered over it. The lid and bottom were sealed with adhesive tape. Ticks to be fed were dropped into the tin through the second hole, which was then closed with adhesive tape. One tin held four male and four female ticks, or fifty nymphs or five hundred larvae. When the various stages were engorged and had dropped from the host they were collected and returned

to the holding tubes where they moulted, or in the case of the females, deposited their eggs.

Two weeks were allowed between ecdysis and feeding. The average time to complete a generation was eighty-one days and the whole life cycle could be obtained in approximately four months. *H. S. Leeson*

JENKINS, D. W. **Trombiculid Mites affecting Man. I. Bionomics with reference to Epidemiology in the United States.** *Amer. J. Hyg.*, 1948, July, v. 48, No. 1, 22–35, 7 figs. [11 refs.]

"Certain phases of the bionomics of the three species of *Eutrombicula* affecting human beings in the United States were studied in relation to epidemiology and control.

"The known geographical distribution of *E. alfreddugèsi* in the United States extends from New York and Nebraska south to Florida, Texas and California. *E. masoni* is now known from the coastal states from Texas to Florida and Massachusetts, also in Wisconsin and Minnesota. *E. batatas* is known in the United States only from Florida, Georgia and Alabama. The average lengths of season during which chigger larvae are active in areas throughout the United States are presented.

"The known host animals for these chiggers include 83 species of mammals, birds, reptiles and amphibians. One hundred and twenty-three host records are presented, based on the determinations of chigger larvae by the author. *E. alfreddugèsi* and *E. masoni* are found on all four groups of vertebrate hosts, while *E. batatas* is found only on the warm-blooded birds and mammals. The time of engorgement of the larvae on the host varied with the time of year, being shortest in July and August.

"The various types of habitats of the larvae and other stages are discussed. Comparative population counts varied from 30 to 300 larvae per minute on 5-inch by 8-inch cards. The seasonal variation in population of larvae and adults is discussed. Adults may be of value in reducing the populations of *Aëdes* and *Psorophora* mosquitoes by eating their eggs. The reproductive potential of chigger adults is high; up to fifteen eggs per day were observed. A definite biweekly ovulation cycle was discovered. Individual female chiggers have lived over one year and produced offspring throughout the year.

"Identification characters of the larvae and field methods of collecting and mounting are presented."

JENKINS, D. W. **Trombiculid Mites affecting Man. II. Control of Larval Behavior for Disease Transmission Studies.** *Amer. J. Hyg.*, 1948, July, v. 48, No. 1, 36–44, 3 figs.

"The behaviour of chigger larvae was studied to facilitate studies of transmission of scrub typhus. Reared 2-day-old larvae of *Eutrombicula masoni* and *E. alfreddugèsi* were used. Activity rates were measured in a glass arena having controlled temperature, relative humidity and light.

"Activity of the chiggers was initiated by change in intensity or direction of light, by movement of air, of the substrate or of a nearby object. The direction of movement was determined almost entirely by light. The reaction to light was positive if the larvae had been adapted to higher light intensities, but was negative if adapted to lower intensities. Larvae moved in the direction of the vector of two light beams. Gravity had no effect in determining the direction of movement, and no negative geotaxis was observed.

"The rate of movement was primarily determined by temperature. Movement took place between 7 and 47C. and was most rapid (3 feet per minute) at 45C. At 35 per cent relative humidity a cold temperature orthokinetic

reaction was observed below 18C. and at 85 per cent. a high temperature orthokinetic effect was observed above 38C. In the normal range of activity between 18 and 38C., the rate of increase in movement rate per degree C at 35 per cent relative humidity was 1·5 times as great as at 85 per cent. With continued movement at a given temperature above 20C. a decrease in movement rate (fatigue) was observed. This was greatest at higher temperatures. The rate of larval movement on the human body was about 2 feet per minute. The intensity of light did not have an effect on the rate of movement except that at very high intensities the movement was slowed down or stopped. Air movement slowed the activity rate, especially if the direction of crawling was toward the source of the air current. Movement was somewhat slower on a rough substrate than on a smooth surface. No difference in the rate of movement was observed between the two species or between reared larvae and those found in the field. The age of the larvae affected the rate of movement only slightly. A diurnal activity rhythm was observed. In the afternoon there was a marked decrease in activity.

"Larval movement was stopped by sudden change in direction or intensity of light, by exposure to very bright light, or to very high or low temperature, or strong air currents. Chiggers often stopped movement and rested when fatigued at higher temperatures below the lethal level.

"By manipulating the environmental conditions around chigger larvae, it was possible to almost completely control their activity. This should be of value in experimental transmission studies in preventing escape of minute chigger larvae infected with scrub typhus."

LABORATORY PROCEDURES

LEON, L. A. Diagnóstico microscópico de las enfermedades tropicales de América. [**Microscopical Diagnosis of Tropical Diseases of America.**] *Universidad Central Publicaciones de la Facultad de Ciencias Medicas.* Quito, Ecuador. 1947, No. 2, 108 pp., 26 figs.

The task undertaken by the author is a praiseworthy one—to assist and guide the laboratory worker in the diagnosis of disease in America. Though the title would limit the conditions to the tropics, his remarks are not confined to these regions but include any met with there. Thus, the diseases dealt with are divided into 5 groups: (1) Bacterial and Rickettsial diseases—bartonellosis, leprosy and plague; (2) fungal conditions—coccidioidomycosis, blastomycosis, mycetoma, sporotrichosis, etc.; (3) spirochaetosis—yaws, pinta, relapsing fever, sodoku, phagedaena, Weil's disease; (4) protozoal diseases—amoebiasis, the flagellates, malaria, leishmaniasis, Chagas's disease and toxoplasmosis; (5) helminthiasis—15 infestations are considered—filariasis, hookworm, onchocerciasis, schistosomiasis, paragonimiasis and the common nematodes and cestodes.

Each is dealt with under the headings of causal agent, material to be taken for examination, staining methods, what is to be seen under the microscope, sources of error [very important] and other investigations to be made for confirmation.

[The letterpress, instructions and descriptions are good, though there are signs of careless proof-reading, *e.g.* Cobbold and Cobbild in successive lines, and Buchereria; the illustrations are poor, about one-third of them are mere smudges and convey no information. If these were improved, the value of a good effort would be much enhanced.] *H. Harold Scott*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

AFRICAN AFFAIRS. 1948, Oct., v. 47, No. 189, 222–7. **The Liverpool School of Tropical Medicine.**

The Liverpool School of Tropical Medicine is celebrating its Jubilee. It is just 50 years since the School was founded by a leading Liverpool shipowner, Sir Alfred Jones, after Joseph Chamberlain's appeal for the study of tropical diseases.

This paper reviews the achievements of the School, particularly in regard to tropical medicine and public health in Africa. It is written primarily for a non-medical public, and the story of that great School needs no re-telling for readers of this *Bulletin*. Among other things, the paper recalls the Liverpool School's connexion with Sir Ronald Ross; the foundation of the Sir Alfred Jones Laboratory in Freetown, its admirable history and those well-known workers who received their early training there; the expeditions and other scientific work inaugurated: the work of Warrington Yorke, particularly in connexion with blackwater fever and the chemotherapy of trypanosomiasis; yellow fever control; the work of the School in two wars, and especially the contribution to malaria control in Freetown: and the now familiar chemotherapeutic work on Paludrine.

This review of fifty years' progress by the oldest of the three principal centres of Tropical Medicine in Britain underlines alike the great contributions which it has made to tropical medicine and hygiene and the need for continued contributions by all concerned to the many still unsolved medical problems which exist in the tropical field. *H. J. O'D. Burke-Gaffney*

KELLAWAY, C. H. **The Wellcome Research Institution.** *Proc. Roy. Soc.* Ser. B. 1948, Oct. 26, v. 135, No. 880, 259–70, 8 figs. on 4 pls.

The Wellcome Research Institution has a distinguished history; it arose from the business firm founded in London in 1880 by the two young American pharmacists, Silas M. Burroughs and Henry S. Wellcome. The name includes the various research branches of the Wellcome Foundation—the Physiological Research Laboratories, the Veterinary Research Station, the Chemical Research Laboratories, the Laboratories of Tropical Medicine, the Museum of Medical Science and the Historical Medical Museum.

The names of the eminent medical and other research workers who have been employed in the Institution are known throughout the world. It would be invidious to select from them, but readers will reserve a special memory for Dr. C. M. Wenyon, for 20 years Director-in-Chief, whose contributions to the *Tropical Diseases Bulletin* have been continuous since the first issue in 1912, up to the time of his death a short time ago.

Dr. Kellaway gives an interesting account of the Institution, illustrated by a few striking photographs. *Charles Wilcocks*

HOODLESS, D. W. **Central Medical School, Suva, Fiji.** Prepared for the Medical Department by the Public Relations Office, Fiji. 1947. 24 pp., 21 figs.

This interesting account of the Central Medical School, Suva, was written by Dr. Hoodless, who was Principal of the School from 1930 to 1946; it does not contain details of course of instruction given, but is rather an informative short history giving the broad outlines of development and scope. It is well illustrated by photographs of students and the School buildings.

Since the inception of the School in 1886, up to the year 1946, 285 young men have graduated and have gone to practise in the islands of the various groups—

Fiji, Tonga, Cook, Samoa, Gilbert and Ellice, Solomon and New Hebrides. They are not trained up to the standard required for medical men in Britain, and they practise under supervision, but they are expected to treat competently all the usual diseases and accidents they meet, and to perform emergency operations of any kind if there is no possibility of removing the patient to hospital.

It is all most attractive and interesting and important. The students in the photographs look happy and full of life, but a special commendation must be reserved for the photograph of the first graduates and two of their tutors, in 1888. [See also this *Bulletin*, 1945, v. 42, 416.] *Charles Wilcocks*

PARRY, H. B., TROWELL, H. C. & BERRY, W. T. C. **Health and Agriculture. Human Needs and the Pastoral Economy of Central Africa.** Reprinted from *Year Book of Agricultural Co-operation, 1947.* 67 pp. [Numerous refs.]

The paper was written by three men with African experience, two of them medical and one a veterinarian interested in uses of pasture. The matter was discussed at a conference on rural life, and this paper is the result. It deals with health and agriculture in the savannah grasslands of Africa. The central problem is to ensure that agricultural production increases more rapidly than the human population which depends on it: if it does so a better standard of living will have been achieved.

The problem is of concern to the medical man because the ability of the population to do manual work is limited by chronic infections, poor health and bad food. It is with these matters that the medical section of the paper deals, in brief and general terms.

The health problems are discussed in relation to problems of finance and administration, land usage, village life and rural planning. The authors see the great difficulty of rousing the African to work out his own salvation. The paper covers a range of subjects, which are skilfully integrated.

P. A. Buxton

BIOCCA, E., AGOSTINUCCI, G. & BRONZINI, E. Ricerche parassitologiche preliminari sulle feci dei mammiferi del giardino zoologico di Roma. [**Parasites among Mammalia in the Zoological Gardens at Rome.**] *Riv. di Parassit.* Rome. 1948, Sept., v. 9, No. 3, 169–75. [12 refs.] English summary (3 lines).

This is the first of a series of records of parasitological infections of animals in the Rome Zoological Gardens. The object of the examinations was twofold: to determine the general health of the animals as regards the presence of parasites and to discover whether any new parasites could be found. Altogether 244 animals' faeces were examined in the 3 months, February–April 1948; these included 3 Families of Primates, the Pre-simian Lemurs, 7 Families of Carnivora, 9 of Ungulata, 3 of Rodentia, and 1 each of Pinnipedia, Edentata and Marsupialia. The Cercopithecidae harboured most. Of 59 examined, 39 were passing *Amoeba* [the different species were not determined except division into those with an iodine vacuole (*Iodamoeba*) and those without], 16 *Blastocystis* and 15 worms or their ova. *Hymenolepis* ova were found in 2 Cebidae and in these only. *Trichuris* ova were passed by 13 Ceropithecides. A table shows the detailed findings of all the examinations made. Attention may be drawn to the presence of *Amoeba* in 8 out of 9 Suidae, 11 out of 13 Cervidae, 13 out of 26 Antelopidae and 7 out of 21 Bovidae. Except for the Cercopitheques mentioned above, helminthic infestations were rare. No amoebae were seen in any Carnivora.

Summing up the findings: amoebae of one kind or other were present in 95 of the 244 (38·9 per cent.) and 65 harboured helminths (26·6 per cent.). [Future papers may reveal details of more interest. These questions have been studied at the Zoological Society of London for many years and among a much larger number of animals.] *H. Harold Scott*

BOOK REVIEWS

MAEGRAITH, Brian [M.A., D.Phil., B.Sc., Oxford; M.B., Adelaide, Professor of Tropical Medicine, Liverpool School of Tropical Medicine, etc.]. **Pathological Processes in Malaria and Blackwater Fever.** pp. xi+430, 6 charts, 22 text figs. & 19 coloured figs. on 1 pl. 1948. Oxford: Blackwell Scientific Publications, Ltd. [35*s*.]

This is a work for the specialist in the pathology and pathogenesis of malarial infections and it will necessarily occupy a place on the shelves of all medical scientific libraries. It is a mine of information on the subject and it is surprising that so much has been condensed in a comparatively small volume. Any review of the work must, therefore, be a mere sampling of the more important aspects touched upon.

Chapter I commences with very full and accurate descriptions of the clinical signs and symptoms of the various kinds of malaria, followed by suggested courses of treatment to cover all types of cases, from the simple uncomplicated case to the malignant types of various kinds. There is also an account of the symptoms and treatment of blackwater fever. After this comes an account of the various parasites responsible for human malaria, which calls for no comment, and this is followed by a consideration of the physiology of malaria parasites and the mode of action of anti-malarial drugs. In this connexion, it is pointed out that the action of such drugs *in vivo* and *in vitro* is not always comparable as some of the drugs most active *in vivo* have little effect *in vitro* in the same concentrations.

A natural follow-up to this opening is a consideration of the blood cells. The blood picture is considered from all aspects and there is cited a voluminous literature dealing with anaemia, the preferences of the various species of malaria parasites for mature or immature cells, the changes in the red cells produced by the parasites, phagocytosis of parasites and erythrocytes, and the mechanisms of haemolysis, sedimentation rate, coagulation time, etc.

Chapter IV gives an account of the literature on the plasma proteins, blood sugar, cholesterol and phospholipoids in the blood in malaria and blackwater fever, as well as of the inorganic constituents and blood pigments.

The general aspects considered up to this point are now followed by more detailed studies of the various organs with regard to clinical evidence of dysfunction and the pathology and pathogenesis of these dysfunctions.

The first organ to be dealt with is the liver. An account is given of the clinical evidence of hepatic dysfunction and there is a detailed consideration of liver function tests as described by various authors. The general consensus of opinion arrived at as a result of these tests would appear to be that all patients adequately studied show some evidence of hepatic dysfunction.

There now follows one of the most important parts of the book, dealing with the actual physical and physiological damage to the liver tissues and with consideration of the mode of causation of these effects. It is pointed out that even gross deviations of function may not always be accompanied by much anatomical change in structure owing to the fact that the changes in function

are reversible, and it is only when their degree becomes so great as to be irreversible that structural cellular changes become visible. The macroscopical changes are first considered, such as the general increase in size of the organ due partly to congestion and partly to hyperplasia of the cellular elements, the dark colour due to deposition of pigment and the change in consistence. The histological changes are then considered in great detail. A general picture is given of some loss of distinctive lobular structure. In conditions of congestion, the central veins and related sinusoids are filled with red cells, many parasitized, whereas in conditions of severe anaemia, the same vessels are dilated and empty. Malarial pigment is abundant in the phagocytic cells lining the sinusoids and these cells are hypertrophied and hyperplastic. The columns of liver cells are widely separated by the dilated sinusoids and all stages of degeneration of the parenchyma cells from mild granular degeneration to complete necrosis may be present. The latter changes are specially evident in the central region of the lobules. The processes of regeneration, cellular infiltration and repair consequent to these changes are then considered. The description so far is of factual findings in the liver and there now follows an important discussion on the pathogenesis of the changes described. In a comparatively short review it is possible to give only the briefest summary of this section and the original must be consulted by advanced workers on malaria.

Stasis and thrombosis due to mechanical obstruction of the capillaries and sinuses by red cells, parasitized or normal, or by other mechanically operating factors, is uncommon. The lesions, therefore, which resemble those found in right heart failure and are caused by anoxia brought about by interference with the return of venous blood from the liver, must have some other cause. The most probable cause may be looked for in active obstruction to the efferent venous flow caused by changes in the venous blood vessels and this may be due to a possible sphincter mechanism in the hepatic veins. The result is a stagnant anoxia similar to that obtaining in heart failure.

Additional factors in bringing about this result might be the hypothetical malarial toxin, by-products of the metabolism of the parasites and, possibly, autoantigenesis of the parenchyma cells. The reason for the central distribution of the lesions in the lobules is not known, but various hypotheses are put forward.

An equally important section deals with the kidney in malaria and blackwater fever. As in the case of the liver, there is first a description of the clinical signs of involvement of the kidneys in all the common forms of malaria. These signs are temporary proteinuria in the acute malarial attack, without involvement of the nephron. More rarely, the nephron may be involved with definite tubular damage but this is more common in the course of chronic, recurrent, or repeated infections, especially in quartan malaria. As regards renal dysfunction in acute malaria and blackwater fever, the evidence is conflicting but there is general agreement on certain points. Thus, acute renal symptoms are commonest in *P. falciparum* infections and vary from simple albuminuria to definite nephritis or nephrosis. Less often the picture simulates an acute streptococcal nephritis with oliguria, uraemia and nitrogen retention, while in recurrent malaria, especially in *P. malariae* infections, the exacerbation of malaria may be accompanied by increase in the existing renal damage leading to death by uraemia.

The pathological changes, both those of a general nature and those specially related to the parenchymatous tissues, are described in acute and chronic malaria and the changes in blackwater fever are separately considered. In the latter case there is general agreement that few changes are found in the glomeruli, most of the damage being confined to the tubules where the epithelium shows degenerative and necrotic lesions and the lumina are plugged with casts.

The chapter dealing with the pathogenesis of the renal lesions is extremely difficult to summarize on account of the number of conflicting theories based largely on animal experiments, and the account should be read in the original. The conclusion is drawn that the pathogenesis of the renal lesions and renal dysfunction in malaria and blackwater fever are essentially identical and not dissimilar to that of syndromes arising in other conditions where there is renal anoxia. The basic aetiological factor is probably anoxia of the renal tissues, especially of the cortex, and for this the term " renal anoxia " is proposed. The renal anoxia, it is suggested, arises from reduced renal blood flow affecting chiefly the cortex and often accompanied by a general peripheral vascular collapse. There is probably, in all cases, a reduction in total renal blood flow and a redistribution of blood flow in the kidney, resulting in anaemia and consequently anoxia of the cortex.

The brain is the next organ to be dealt with. Clinical manifestations of involvement of the brain have such an immense literature that no attempt is made by the author to deal with them and the reader is referred to the many reviews on the subject. The pathological changes in the brain, both macroscopical and histological, are described on conventional lines and need not be enlarged on beyond saying that the descriptions relate almost entirely to materials derived from fatal cases of *falciparum* malaria and blackwater fever.

The pathogenesis of the brain lesions is less complicated than that of the liver and kidney lesions. The lesions most consistently present involve the blood vessels, capillaries and small arterioles, especially those of the white matter. The older view that the vascular damage is due to obstruction of the blood flow in the smaller vessels accompanied by diapedesis of red cells and that degenerative changes in the nervous tissues are the result of deprivation of their blood supply may have to be modified. The latter opinion may still be correct in as much as the condition will necessarily lead to anoxia of the tissues ; but the cause of the stasis is probably not direct obstruction, but concentration of the corpuscles due to loss of fluid from the vessels through damage to their endothelial lining, rendering them permeable. The primary cause or causes of these effects are more obscure and are discussed at some length.

The spleen and bone marrow are next dealt with. The naked-eye and histological appearances are described and the pathogenesis of the changes is considered.

The adrenals in malaria are discussed in a short section. Clinical symptoms in some kinds of pernicious malaria are similar to those of adrenal insufficiency to such an extent as to have been remarked upon by many workers. However, symptoms closely resembling traumatic shock may sometimes be seen in malaria without obvious adrenal damage and it is difficult to assess accurately the rôle of the adrenals in the pathogenesis of malaria. Clinical evidence is based on the asthenia, lowered arterial pressure and peripheral vascular failure with skin pigmentation, abdominal cramps, etc., as well as on chemical evidence on the blood and tissues but it has to be noted that conditions such as shock and anoxia which are concomitants of severe malaria may give rise to the same chemical evidences.

The heart in malaria, as an organ seldom seriously affected, is dealt with quite shortly and calls for no special mention.

The concluding chapter deals with some pathological processes in malaria not covered in the previous chapters. The paroxysm is considered a reaction to a non-specific pyrogenic agent, the precipitating factor being as yet undetermined. Anoxaemia, the rôle of haemozoin and circulatory phenomena, are also considered.

The tissue responses are no more than touched upon and this also applies to the question of immunity, natural and acquired.

Misprints and such minor blemishes are conspicuous by their rarity and those mentioned here are noted merely for correction in any subsequent edition. Thus, in the description of *P. malariae* on pages 43 and 44, no reference is made to the presence of Ziemann's dots in the cytoplasm of the red cells although the absence of Schüffner's dots and Maurer's dots is mentioned. On page 323 " Paisseau " is wrongly spelt in the last paragraph.

In a book covering so large a field, compilation of published work must form a great part and the sources of information are given in brackets. These brackets become somewhat wearisome in continuous reading although the reviewer can offer no substitute for them and these very references make the work one of great value.

It is a pleasure to record the smooth phraseology and excellent construction of sentences throughout the work, which make for complete clarity in the exposition of the author's views, a merit often lacking in scientific works.

H. E. Shortt

GIGLIOLI, George [M.D.It., M.R.C.P.Lond., D.T.M. & H.Eng., Medical Adviser, B.G. Sugar Producers' Association, etc.]. **Malaria, Filariasis and Yellow Fever in British Guiana. Control by Residual D.D.T. Methods with special reference to Progress made in eradicating *A. darlingi* and *Aedes aegypti* from the Settled Coastlands.** With Foreword by F. L. SOPER, M.D. pp. x+226, 47 figs. 1948. Mosquito Control Service, Medical Department, British Guiana.

There has been no publication with a more important bearing on the policy of malaria than this since the appearance of SOPER and WILSON's " *Anopheles gambiae* in Brazil, 1930 to 1940 " [this *Bulletin*, 1944, v. 41, 324]. That account described for the first time how anopheline species could be eradicated from large areas by the time-honoured methods of larval destruction. This is the first really full account of which the reviewer is aware which sets out all the details of anopheline eradication by the new means of destruction of adult mosquitoes with residual insecticides.

Lest too much should be assumed on the transferability of data and conclusions, it is well to emphasize the author's words that today, as in the past, generalizations are not possible *in re malariae*. His findings and conclusions refer exclusively to British Guiana mosquitoes and British Guiana conditions. But with this necessary qualification the work described should set a standard for much else.

British Guiana lies between 1° and 8°N. It has a population of 375,819 souls, of whom 90·5 per cent. are concentrated in a narrow coastal belt which is from 2 to 4 miles broad, and where much of the land is at or below sea level and devoted to the farming of sugar cane. The climate is hot and moist throughout the year, the annual rainfall (94 inches) is distributed throughout the year, but mainly occurs in the spring and early summer. Malaria is endemic, normal spleen rates ranging around 40 per cent. except in some small favoured areas where they range round 10 per cent. Sixteen species of anophelines are recorded, and of them three may be malaria carriers, *Anopheles darlingi*, *A. aquasalis*, and *A. albitarsis*. The first of these is undoubtedly an important carrier responsible for the transmission of malaria over most of the populated coastal belt, and the other two may have an influence in restricted, less malarious, areas.

A. darlingi is naturally a forest species, artificially encouraged in the open cultivated coast lands where it breeds profusely in the irrigation system, its

associated swamps, and in the cultivated fields themselves. The adult is very domestic, shelters exclusively in houses, and feeds almost entirely on human blood. The houses are for the most part built of sawn hardwood, sometimes with paper or other decoration.

The potential value of DDT in these conditions was realized in 1944, and the initial experimental work was carried out by SYMES and HADAWAY in 1945 [this *Bulletin*, 1945, v. 42, 785]. Since then, adult mosquito destruction by DDT has been extended through the entire area of the populated coastal strip under a dual organization in which Government and the planting industry have cooperated.

Most available varieties of material and apparatus have been tried and are reported on. After the initial trials, a 5 per cent. solution of DDT in kerosene was adopted as the standard material; it was applied mainly from stirrup pumps with an improved, locally made, nozzle at a dosage which rarely varied greatly from the standard 150 to 160 mgm. per sq. ft. (5·3 to 5·7 ounces per 1,000 sq. ft.) which was considered best suited to local conditions. Observation showed that an interval of 8 to 10 months between sprayings kept up a sufficient lethal effect and a normal period of 8 months was decided on.

The author realizes and emphasizes that the non-absorbent nature of the typical wall surface and the habits of *A. darlingi* were greatly in his favour. Treatment of houses resulted in an immediate great reduction in the numbers of all anopheline species and marked but short-lived reduction in the numbers of *Culex fatigans*. When some, but not all, houses were treated anopheline breeding was maintained, but when all houses in any one locality were treated, the reduction in *A. darlingi* was so great as to end in a total cessation of breeding, though no anti-larval measures had been applied. For instance, in one area partial treatment was carried out in 1945 and 1946, in which years 3,230 and 713 potential breeding areas were searched and 21 per cent. and 23 per cent. found positive. In 1947 all houses were treated and all of 867 breeding places searched proved negative. Extension of this principle of complete treatment throughout the coastal belt has resulted in the complete eradication of *A. darlingi* from it.

"The eradication of this very dangerous malaria carrier has been achieved by DDT used exclusively as a residual spray applied to the interior of houses, completely ignoring all phases of hydrological control. These results . . . are all the more significant as a more hopelessly difficult hydrological situation could hardly be conceived".

The effects on malaria are equally marked but much more delayed in their appearance. There was a steady slow decline in the spleen rate; in a typical example records before and at roughly six-monthly intervals after the first application of insecticide were, before treatment 71·6; after treatment, 46·5, 32·0, 28·2, 17·9, 12·2, 8·0, 4·0. Changes in the parasite rate did not follow this course. In the same example, the corresponding parasite rates were, before treatment 40·3, after treatment 18·0, 30·7, 33·3, 27·1, 41·1, 6·9, 3·0. On analysis of the slow reduction it is shown that *Plasmodium falciparum* infections rapidly decreased, in most places disappearing within 24 months. *P. vivax* infections persisted longer and *P. malariae* was yet more obstinate. The numbers of parasites of all three species decreased quickly, so that a couple of years after the initial treatment few films contained more than two or three rings the species of which was difficult to identify.

The average annual cost for establishing and maintaining control, including repeat spraying and all overheads, amounted to 5·43 per house, or 0·637 *per caput*. As *A. darlingi* persists in the interior forests, some large part of this must be considered as a permanently recurring expense.

Filariasis, due to *Wuchereria bancrofti* carried by *Culex fatigans* can be shown in about 16 per cent. of the population by a single blood film examination. This mosquito is much less susceptible to destruction by DDT than is *A. darlingi*, and cannot be brought under complete control by it unless anti-larval measures are simultaneously practised. The author fears the risk that strains which are highly resistant to DDT may develop. However it is partially susceptible, not only are its numbers greatly decreased but its normal span of life is lessened in a treated area so that mature embryos are rarely seen, and the author is hopeful that transmission of the worm may be greatly impeded. The long life of the parasite in man makes factual observation on this point difficult until a new generation of people brought up under the new conditions can be examined.

British Guiana has suffered from urban yellow fever and is within the endemic area of jungle yellow fever so that *Aëdes* control is constantly necessary. In the past this has been carried out in townships by standard measures directed against breeding, by which it had been found possible to secure eradication in any locality in four months at a cost of $4.18 per house or $1.39 per head of population. Trial showed that, with DDT residual spray, this result could be achieved in 13 weeks at a cost of $1.76 per house or $0.47 per head of population. Re-infestation of breeding places occurred at about 10 months after treatment of houses. In, apparently, townships where regular spraying for the control of malaria is not needed, a combination of adult destruction with sealing of barrels, drums and suchlike breeding places has been adopted as the most economical and effective.

The reviewer has tried to excerpt the outstanding points from a most comprehensive report, omitting reference to dozens of important points which are fully described. Despite the pertinence of the original warning, this is a publication of very wide interest. *G. Macdonald*

STITT, E. R. [M.D., Ph.M., Sc.D., LL.D., etc.], CLOUGH, Paul W. [M.D., etc.] & BRANHAM, Sara E. [M.D., Ph.D., Sc.D., etc.] & Contributors. **Practical Bacteriology, Hematology, and Parasitology.** Tenth Edition. pp. xiv +991, 7 coloured pls. & numerous text figs. 1948. London: H. K. Lewis & Co. Ltd. [50*s*.]

Each successive edition, this being the tenth, of this deservedly well-known text book has been a matter of interest and importance to laboratory workers dealing with medical subjects.

This latest edition is under the names of STITT, E. R., CLOUGH, P. W. and BRANHAM, S. E., the last-named being added for the first time, while the name of M. Clough has been dropped. In size, the work has changed little and the format is similar to that of previous editions.

As in previous editions the majority of the illustrations are excellent but there is a considerable number of new figures, not all of which are happily chosen.

The present edition, as the previous one, is divided into four main sections dealing with Bacteriology, Haematology, Parasitology and Clinical and Pathological Examination of Body Fluids and Organs. These sections are followed by an appendix describing various laboratory procedures not previously dealt with in the text. While it is impossible adequately to review a book of this size in a limited space, a short consideration of the various sections is necessary merely to denote their scope and usefulness.

Bacteriology

This is dealt with in 12 chapters, totalling 373 pages which comprise more than a third of the entire book. Most aspects of bacteriology and bacterial

immunity are dealt with and the section also contains chapters on the filtrable viruses and on medical mycology. One might suggest that the latter, at least, possibly deserved a section to itself. Descriptions and methods of identification of bacteria causing disease are described and a number of useful synoptic tables is included. The spirochaetes, rickettsiae and filtrable viruses are adequately dealt with within the limits of space available but cultivation of the filtrable viruses is given not much more than half a page on pages 17 and 19. Bacteriophage is similarly dealt with in a page and a half and no account is given of its use in typing strains of bacteria. Medical mycology receives somewhat less space than its importance, especially in the tropics, would warrant, but it cannot be said that anything of great importance is omitted. One quite obvious error is the photograph on p. 244 purporting to depict *Leishmania* in heart muscle for comparison with a lesion due to *Histoplasma capsulatum*. It is clear that the first figure illustrates infection of heart muscle with the leishmania forms of *Trypanosoma cruzi* and the mistake is unnecessarily emphasized on page 522 where the identical photograph is correctly given as an illustration of infection with that parasite.

The chapter on immunity and hypersensitiveness contains much in little space and the remaining two chapters describe most of the media and staining methods likely to be used in general laboratories.

In this large section it is inevitable that there should be some errors and omissions of which, apart from that already noted, one may be mentioned since it occurs in the important table on page 18 listing diseases of animals transmissible to man. Obvious omissions here are leishmaniasis, American trypanosomiasis, balantidiosis and tick-borne relapsing fever, in all of which the natural reservoirs may be animals.

Haematology

This is a good section. The techniques of blood examinations are described quite fully and there follows a description of the normal and pathological elements of the blood. From this there proceeds, naturally, the description of various blood diseases.

The name of such a well-known stain as Mayer's haemalum is wrongly spelt " Meyer " on page 389.

Parasitology

This is one of the major sections and is divided into parts dealing with Protozoology, Helminthology and Entomology. The first part of the section deals with Medical Protozoology and commences with a table of protozoa causing specific human diseases. This seems fairly complete but *Toxoplasma* is omitted although on page 535 it is referred to as a " protozoan " (*sic.*). On the other hand, *Plasmodium knowlesi* is included although the fact that it is inoculable to man does not make it a protozoon causing a specific human disease.

On page 488 again, *P. knowlesi* is listed as a cause of disease in man and in the same connexion, the name of such a well-known worker in malaria as Sinton is wrongly spelt. In the same small list the equally well-known Stephens is also wrongly spelt.

On page 494 in talking of the gametocytes of malaria, the statement is made " gametocytes do not produce symptoms and disappear if not picked up by the appropriate mosquito." The meaning of this is quite obscure. On page 495 in describing the reasons for the commonly-applied titles " benign tertian ", " malignant tertian " and " quartan ", the reason given for the first of these titles is " because the untreated infection usually terminates in a few days or weeks without serious effects on the host." In view of the notorious tendency

of this parasite to resist cure even when the natural defences of the body are aided by anti-malarial drugs, this statement is difficult to accept.

The section on diagnosis of malaria in man, page 497, gives one the impression of an armchair approach to a practical problem. In practice, if thin and thick films were consistently negative, is it probable that recourse would be had to inoculation of blood into a susceptible person or to sternal puncture even if the latter, as suggested, should replace "the hazardous splenic puncture?" Also, on page 502 under the heading of *Plasmodium knowlesi* what is the meaning of the words "while this parasite is not likely to be encountered without previous knowledge of the species involved"? It is not a knowledge of the species which would prevent it being encountered but the fact that it is not a human species. The section on malaria, apart from such small but irritating inaccuracies, is not among the best in a work where such high standards have been maintained in the past.

The blood flagellates occupy 12 pages, of which the space of 4 pages is taken up by illustrations. As regards culture media, NNN medium is dismissed after mere mention, although it is the standard method used in many countries. This is a pity as it is so easy to prepare and so generally useful. In dealing with diagnosis, the complement fixation test for kala azar, involving the use of acid-fast organisms in preparing an antigen, is not discussed specifically although it has been so favourably reported on in India.

The intestinal protozoa are adequately dealt with but one would have expected more information than is given on the gross and microscopical appearances in liver abscess due to *E. histolytica*.

The chapters on helminthology give a good account of all the parasites likely to be encountered in man and most of the information a medical officer in the tropics might require is to be found in the 96 pages devoted to this section. There are some minor errors such as on page 596 where *Loa loa* (Cobbold 1864) Castellani and Chalmers, 1813, is obviously wrong as regards the second date.

Entomology

This is a small section of only 60 pages. Scrub typhus, which was an important war disease in the Far East and Pacific war areas, is dismissed in 12½ lines on page 177 and the vectors in 6½ lines on page 662. The space given to the vectors is less than that allotted to butterflies and moths.

In dealing with the genus *Phlebotomus*, some of the vectors of kala azar in the Mediterranean area and in China are given as though they were proven without doubt.

The mosquitoes are hardly given the space their world-wide importance would appear to earn and the two pictorial keys to adults and larvae, refer only to species found in the United States.

Part IV of 176 pages is one of the main sections of the work. It describes all the clinical and pathological examinations likely to be required in respect of body fluids and organs. The section is excellent and it is not necessary to pick out particular details.

The index is disappointing. There is no mention in the index of the mouse protection test in yellow fever although it is described in the text. Similarly "sternal puncture" is not mentioned in these words although described in the text.

Tissue culture is looked for in vain in the index and the same applies to spleen puncture, the technique of which does not appear to be described. Many other instances could be cited of facts presented in the text but which it would be difficult to locate by the index.

So far it is chiefly defects and omissions which have been pointed out in order that they may be remedied in the next edition. This has always been, and still is, so useful a book that the issue of further editions is assured.

The scope of the work is so wide that one is astonished to find so few of the real essentials omitted and the book can be confidently recommended to workers in laboratories where an extensive library does not exist and especially to those who may wish to have only one " omnibus " work to carry about.

H. E. Shortt

BREED, Robert S. [New York State Experiment Station (Cornell University), Geneva, New York], MURRAY, E. G. D. [McGill University, Montreal, Quebec, Canada] & HITCHENS, A. Parker [University of Pennsylvania, Philadelphia, Penn.]. **Bergey's Manual of Determinative Bacteriology.** Sixth Edition. pp. xvi+1529. 1948. London: Baillière, Tindall & Cox, 7 & 8, Henrietta Street, W.C.2. [82*s*. 6*d*.] [Review appears also in *Bulletin of Hygiene*.]

The new edition of this work is an imposing manual. It is over 1,500 pages long and contains an enormous amount of information; descriptions of 300 new species are included. A saving of space has been effected by using double columns for each page, and the result is very pleasing. A further innovation is the inclusion of an index giving the source and habitat of different bacteria. This should be extremely useful. It must have taken a lot of time and labour to compile, and it is natural that some inconsistencies should have occurred. For instance, twelve organisms are listed under " Conjunctivitis ", but only three under the " Eye "; six organisms are listed under " Arthritis " but only two under " Joints ", and so on. The book as a whole, though bulky, is well produced; it opens flat at any part, and the pages do not stick together; it is admirable, therefore, for reference work, and is a credit to both the authors and the publishers.

Most students of bacteriology are already well acquainted with the principles and subject matter of the book, and there will be no need to remind them of the extent to which the authors, for the sake of taxonomic completeness, have carried the classification and nomenclature of micro-organisms. Not only the true bacteria, about which we still know far too little, are neatly docketed, but even the bacteriophages and filtrable viruses, whose very nature is still in doubt, are duly provided with their names and ranks. Serious writers are therefore asked to refer to a staphylococcal phage as *Phagus caducus*, to the lymphogranuloma virus as *Miyagawanella lymphogranulomatis*, to the foot-and-mouth virus as *Hostis pecoris*, to the mumps virus as *Rabula inflans*, and to the yellow fever virus as *Charon evagatus*.

The old die-hard breed of bacteriologists who would admit no generic extensions beyond *Bacillus*, *Streptococcus*, *Staphylococcus*, and *Micrococcus* have undoubtedly lost the day, and good terms such as *Brucella*, *Clostridium*, and *Salmonella*, have come to stay; but it may be doubted whether it is wise to pursue the road to classificatory completeness as far as the present authors have done. As a concordance to the book of descriptive bacteriology, Bergey's Manual is indispensable: as a guide to taxonomy and nomenclature its value may perhaps be doubted.

G. S. Wilson

GHOSH, Birendra Nath [F.R.F.P. & S. (Glasg.), F.R.S. (Edin.), etc.]. **A Treatise on Hygiene and Public Health with special reference to the Tropics.** 12th Edition. pp. xvi+764, 153 figs. 1948. Calcutta: Scientific Publishing Co. [Rs.15 or 22*s*. 6*d*.] [Review appears also in *Bulletin of Hygiene*.]

Yet another edition of this excellent work has appeared, within three years of the preceding and it bears all the signs of very careful revision and of unremitting energy in bringing the information up to date, in eliminating

redundancies and in re-writing whole sections instead of merely patching. To speak of general matters first. The whole format has been changed, recast. The print is larger and clearer, nevertheless by judicious elision of what is, or what has in the course of time become, redundant, by placing subjects of subsidiary importance formerly in large print into small print, in spite of many additions—and these are to be found in every chapter—the author has not materially increased the size of the book ; it is only 54 pages longer than the last edition. Ten redundant figures have been omitted ; five new ones appear and another, the Normal or Probability Curve, is given in a new and better form. It is a pity (this may be purely a personal view) that the illustration of the artificial cooling of a room has been dropped. An error in the numbering of figures has crept in ; those on pp. 307 and 352 are both numbered Fig. 64, and those on pp. 366 and 379 both Fig. 68. The titles of two chapters have been changed : Chapter 23, Restraint of Infection becomes Control of Infection, and Chapter 28, Vital Statistics is enlarged to Statistics and Statistical Methods. Though it is essentially a "one-man book", the author has availed himself of a judicious choice of helpers whose share is generously acknowledged. Proof reading has been carefully done ; misprints are few ; only a dozen have been noticed in the whole work of over 700 pages.

So much for general points ; we pass on to some in more detail. The Introductory chapter on Preventive Medicine and Public Health Administration is nearly double the length of that of the 11th edition and is a great improvement. Chapter I on the routine bacteriological examination of water is now in small print. Chapter II has additional sections on Air Disinfection and on War Gases, and that dealing with the amount of air required for ventilation has been rewritten. Some additions have been made on examination of the ventilation of a room, and on p. 97 estimation of hydrogen by katharometer is mentioned, but the instrument is not described. Into Chapter III on Occupational Hygiene there have been several subjects introduced ; notably improvements in the status and welfare of the industrial worker, his housing and nutrition, maternity benefits, the establishment of crèches and first-aid posts. The dangers of manganese poisoning, omitted in previous editions, are now dealt with. This chapter will in the future assume even more importance when the papers (more than 200) presented to the recent International Congress on Industrial Medicine held in London last September are published.

Chapters IV and V, on Soil and Housing, have been revised and sections previously in large print are now relegated to small. Chapters VI–X on Food have been added to and amplified, especially the sections dealing with vitamins and food preservation. Fish poisoning deserves more than the cursory mention accorded to it in 11 lines. Much of what was written on Eugenics in the preceding edition in chapter XV devoted to Personal Hygiene has wisely been omitted in the new issue, notably the summary of the policy of the British Eugenics Society. No mention is made of dhobie itch, a troublesome condition in the tropics, or of its varieties about which a good deal has been written in late years. Chapter XVIII, on Maternity and Child Welfare, still retains the figures of ten and more years ago. It should be possible to obtain more recent data on maternal mortality in England and Wales than those of 1938, those in Madras city in 1932, and in Calcutta and Bombay in 1937 and 1938 respectively.

In Chapter XXI, Infection and Carriers of Infection, space has been saved by substituting small print for the section describing types of infecting organisms and a section dealing with escape of organisms from the respiratory, intestinal and urinary tracts has been inserted. The incubation period of whooping-cough has been changed from 4 to 14 days to 7–14 days. This is known to be variable but the limits are thought to be wider than these ; 3 days

to 3 weeks has been claimed. The diction on p. 401 is a little doubtful. We must repeat, regarding chapter XXII, the same criticism which was made on the previous edition that without indication of the magnification of figures but merely measurements stated in the text, the relative sizes of helminths depicted are liable to mislead; for example, on p. 442 *Gastrodiscoides hominis* would appear to have four or five times the bulk of *Fasciolopsis buskii*.

Chapter XXIV is one of the most important in the book, dealing with Epidemiology and Preventable Diseases. Incorporation of Shortt and Garnham's work on the exo-erythrocytic stage of the malaria parasite (not published until March, 1948) indicates how closely to date the author has brought his observations; inclusion of remarks on Gammexane is further evidence of this, as is the inclusion of a recent graph of cholera mortality in Bombay in 1945–46. No mention is to be found of the annular erythematous rash of African trypanosomiasis, and the American form is still wrongly called Chaga's disease; *Nosopsyllus fasciatus* is given its discarded name *Ceratophyllus*. The use of live vaccine in plague prophylaxis is introduced. The statement, repeated in former editions, of second attacks of yellow fever has been expunged but, on the other hand, not many who have lived and worked in countries where enteric fever is common will agree that "relative immunity lasts for a long time, frequently for life." Sir Almroth Wright's figures of the results of TAB inoculation in the First World War are given, but none more recent. In view of the large epidemics of alastrim which may occur, and in fact have occurred, this type of smallpox deserves more than transitory mention in a couple of lines. The introductory section on Dietetic Diseases is good and new. One still looks in vain for remarks on infantile beriberi and Dr. Fehily's work in connexion therewith. The rabies section is confused; remarks on the virus actually refer to the Negri body and not to the filtrable virus, and mention, we think, should be made that the more acute and more rapidly fatal the disease the smaller are the Negri bodies and consequently the harder to find and the greater likelihood of their being missed. The explanation accounting for the variability of incubation period of rabies needs amplification. The account of leprosy has been practically rewritten and brought up to date, especially that part which deals with control and prevention. Finally, a third appendix has been added, the P.H. (Aircraft) Regulations, 1938, in conformity with the International Sanitary Convention for Aerial Navigation.

The above criticisms are not made in any carping spirit, but as suggestions for the author's consideration; the book remains one of the best works on Public Health known to the reviewer, and the author is to be most heartily congratulated on the success of his efforts. *H. Harold Scott*

The Nomenclature of Disease drawn up by a Joint Committee appointed by the Royal College of Physicians of London. 7th Edition (being the 6th Revision subject to Decennial Revision). pp. xiii+384. 1948. London: H.M. Stationery Office. [8*s*. 6*d*.] [Review appears also in *Bulletin of Hygiene*.]

Since the sixth edition of this work was published 17 years ago, a number of classifications of disease have been produced in Britain and the United States. These have embodied statistical indices and it is recognized that while a statistical classification and a nomenclature serve common ends, they should not be confused. In the introduction this distinction is made clear by quotations from authoritative sources; and it is emphasized that the Sub-Committee

charged by the Royal College of Physicians of London in 1944 with the compilation of the present work " has been solely concerned with providing a Nomenclature of Disease, though it has designed its classifications to serve as a basis for a statistical code". The list of members of the Committee and Sub-Committee is an impressive one, occupying three pages, and it is evident from the names that no pains were spared to obtain the most expert advice available in the preparation of each of the many sub-divisions of the subject matter. That it should be nearly five years since the work was begun makes it inevitable that a great deal of the results of medical research, especially during wartime, should not be revealed in these pages. This is a failing which can hardly be overcome, particularly at the moment when publishing difficulties are manifold, since a task so vast and ever expanding must need revision almost as soon as it has been completed, if it is to be up to date. Nevertheless, the Nomenclature is as up to date as it could possibly be made : and the time which it has taken to compile is also evidence of the immense amount of care and labour which has gone into its preparation.

The volume opens with an aetiological classification of disease, under such general headings as mechanical, structural, functional, metabolic and prenatal influences. There then follow the aetiological agents in diseases due to plant and animal parasites. The diseases themselves are first named alphabetically and lists of pathogenic bacteria, spirochaetes, rickettsiae, viruses and fungi follow. These in turn, are followed by lists of protozoa, helminths and arthropods, with the diseases caused or carried by them and their habitat, where this can be defined. An excellent feature is a list of diseases carried by arthropods, with full lists of vector species. There then follows the aetiology of diseases due to intoxication, physical agents, circulatory, blood, nervous and undetermined causes.

The second part of the book gives a systematic list of diseases on a regional basis and this occupies over two-thirds of the volume.

A feature of particular value is the appended list of eponyms, which occupies some 14 pages and includes a large number of diseases commonly having eponymic descriptions, with their scientific definitions attached. Two final pages in this list include diseases named after locality and occupation : the former is perhaps of questionable value, since the number of geographical and topographical attributes given to many diseases is very large, and the inclusion of some, but not all, of the well-known names is, perhaps, apt to be confusing. For example, cutaneous leishmaniasis is given as the definition of Baghdad Sore, Delhi Sore, Lahore Sore, Oriental Sore and Natal Boil : while Aleppo Boil and Biskra Button are shown as Baghdad Sore. A number of geographical names, besides the more familiar ones, are given for brucellosis : and Hong Kong ear is defined as aural aspergillosis [though in the reviewer's experience, a common tropical ear infection in which *Ps. pyocyanea* is prominent has been named in turn after most of the better-known tropical cities]. Egyptian splenomegaly is defined as Kala Azar, though it should perhaps correctly be reserved for a feature of schistosomiasis.

These very minor criticisms among tens of thousands of entries will be regarded, it is hoped, as evidence not of defects in the work, but of its outstanding lack of them. This Nomenclature is monumental in scope and presentation alike : because of the immense amount of practical and definitive information which it contains, it should never be outside easy reach of any medical workers' hand ; for without it, it would be difficult for him indeed to maintain in his writings such a standard of wide and accurate definition as medical activity demands and the present compilers have achieved.

H. J. O'D. Burke-Gaffney

NEW YORK STATE DEPT. OF HEALTH. **Laboratory Manual for Physicians. Aids in Diagnosis and Treatment.** Ninth Edition. pp. vii+126, 9 figs. 1948. Issued by Division of Laboratories and Research, Albany. [Review appears also in *Bulletin of Hygiene.*]

The staff of the Division of Laboratories and Research, New York State Department of Health, are in a position to speak with a considerable weight of authority on laboratory services since, for example, in the year 1947 alone, the total number of tests performed in their laboratories amounted to more than six million.

The need for and value of a Manual of this nature are made clear in the Introduction, where it is stated that "one problem has obstinately remained. It is the difficulty of training clinicians and pathologists to work together as effectively as is possible. It is a problem incapable of simple solution or explanation." This theme is developed further and various means employed, to overcome obstacles are described. It is not generally known, perhaps, that the New York State Association of Public Health Laboratories maintains a standing Committee on the use of laboratory facilities and that it distributes appropriate leaflets. This *Laboratory Manual* is directed towards the same end, namely of providing concise and practical information for the guidance of clinicians in selecting, taking, handling and despatching material for laboratory examination. The Manual also contains information regarding the Public Health Law, the Sanitary Code and the U.S. Postal Laws and Regulations in so far as these are relevant.

The Manual opens with a description of the organization of the Public Health Laboratory service in the State. The second part deals with submission of specimens, specimen outfits and their preparation: biological products, their distribution, use and reactions which may follow them, and the precautions to be taken. There then follows the main part of the Manual, occupying some 80 pages, namely an alphabetical list of communicable diseases and the laboratory aids appropriate to them. This includes bacterial, protozoal, helminthic, virus and rickettsial diseases, their nature, the source of specimens to be taken and the best means of obtaining them, followed in each case by an admirable description of the relevant therapeutic and prophylactic products provided by the laboratory, with their dosages and means of administration. Further parts deal with examinations relating to water, sewage, dairy products and with food utensils. There are brief chapters on recording and reporting results and of distribution of laboratory supplies.

The book is essentially for local use, and will prove of most value to those having contact with the Division itself: but it is full of useful practical information from which any clinician requiring laboratory services should profit and which fills a need existing in medical circles everywhere. Within little more than 120 pages, it provides the practitioner with all the essential information which he may need regarding his contacts with a routine laboratory and its service to him.

In the closing paragraph of the Introduction, it is pointed out that "a cardinal principle of the Division has been that laboratory services should be consultative, that close relations are necessary between the physician and the pathologist." This volume should go far in promoting such relations on a sound and practical basis. *H. J. O'D. Burke-Gaffney*

VOGEL, Hans. **Grundriss der Tropenkrankheiten.** [Essentials of Tropical Medicine.] 143 pp. 1947. Stuttgart: Georg Thieme Verlag.

Restrictions which have been in force as the result of the recent war have rendered it desirable to produce a practical handbook in a small compass for

the use of students attending courses at the well-known School of Tropical Medicine in Hamburg. The need for such a work has become more urgent because of the impossibility of acquiring standard books under the present conditions and the unsuitability of the larger monographs for the average student. The condensed nature of the handbook necessarily renders it unsuited for a detailed review. A list of the contents, however, gives some idea of its comprehensive nature and its adequacy for the objects it has in view.

The subjects considered are arthropods as disease transmitters, protozoal, spirochaetal, bacterial, virus diseases, rickettsiases, helminthic diseases, fungus diseases, nutritional diseases, snakes, other poisonous creatures and laboratory methods. Illustrations are lacking.

Considering the synoptical character of this booklet the amount of practical information it contains is very considerable. *P. Manson-Bahr*

WEYER, Fritz. **Grundriss der medizinischen Entomologie. Mit Einschluss der uebrigen medizinisch wichtigen Gliederflüssler.** [Essentials of Medical Entomology.] 2nd Edition. pp. viii + 132, 63 figs. 1948. Leipzig: Johann Ambrosius Barth.

The present book is a short introduction covering the whole range of medical entomology. It is written for the man with only a slight training in entomology and would be suitable for medical men taking some such course as that for a Diploma in Tropical Medicine. About half the book is general and half deals with the insects in a systematic arrangement.

The book opens with an account of the general classification and anatomy of Arthropods. The author then passes on to give an account of the outstanding points in the physiology and life history of insects. He refers to such subjects as growth, moulting and metamorphosis: the effect of temperature on the length of the life cycle: hibernation, which is closely dependent upon climate, and particularly temperature: and the climatic limits within which biological processes are normally conducted. Later in the book, the ticks are dealt with in a similar manner. The general account of parasitism gives a formal statement of the meaning of predator, parasite, etc., and points out that parasitism may be permanent or temporary, highly specific or not: it may occur at various stages in the life history. There are certain cases in which parasites are fatal to their prey. The author deals in a general way with venomous arthropods.

About half the book, some sixty pages, takes the Orders, Families, etc., of Arthropods which are of medical or veterinary importance and gives their morphological characters, the essential points in life history and in more detail an account of the blood-sucking forms. There is some tendency to give a disproportionate amount of space to insects which are of very minor importance. For instance, the dragon flies which are only of interest because one or two of them are intermediate hosts of a flat worm parasitic in poultry, receive half a page. A similar space is given to the Rhagionidae, a family of flies of which a few species are blood-suckers, one or two of which occasionally bite man in America and Australia. On the other hand, the Anoplura or sucking lice of man and cattle receive only one and a half pages.

The author has certainly provided a brief account which covers the whole range of the subject. There is no equivalent recent book in English or French. His approach to the subject is zoological and for the most part anatomical, and his presentation is solid, orderly and formal. The reader may well ask whether something could not be done to make these dry bones live. *P. A. Buxton*

ZELIFF, C. Courson [M.S., Ph.D., Assistant Professor of Human Parasitology and Zoology, the Pennsylvania State College]. **Manual of Medical Parasitology with Techniques for Laboratory Diagnosis and Notes on related Animal Parasites.** pp. xiv+159, 68 figs. on 13 pls. & 44 coloured figs. on pl. 1947. Pennsylvania: State College. [22*s*. 6*d*.]

This is a useful publication which hardly merits the title of a book. It consists mainly of a series of cyclostyled notes designed for the use of students taking a laboratory course in tropical medicine; another useful purpose it can fulfil is to serve as a reference work for technicians or as a vade-mecum for laboratory workers in the tropics. Commencing with amoebae, these notes range through the familiar ground of flagellates, leishmaniae, trypanosomes, malaria parasites, coccidia and the whole range of helminthology. Medical arachnology and medical entomology are fully treated and in many instances keys to larval and adult characters are given. The last 40 pages are devoted to details of laboratory diagnosis and laboratory techniques. This section includes methods of faeces examination, preservation of specimens, concentration methods, mounting of entomological specimens, etc.

It is a matter for regret that the photographic reproductions of parasites and cells are so blurred and indistinct as, in some cases, to be almost undecipherable. This also applies to the legends, which are so much reduced as to be quite illegible. Reference is made especially to Plate VI where the reduction has been carried so far as to render the microfilariae unrecognizable even with a hand lens. The line drawings mainly devoted to entomology are quite distinct.

Appended there is a list of references, a glossary of generic and specific names of important human parasites, and an adequate index. *P. Manson-Bahr*

REICHENOW, Eduard. **Grundriss der Protozoologie für Arzte und Tierärzte.** [Fundamentals of Protozoology for Medical and Veterinary Workers.] 2nd Edition. pp. vi+99, 77 figs. 1946. Leipzig: Verlag von Johann Ambrosius Barth.

This is a second edition, somewhat enlarged, of the book which first appeared in 1943. The present edition appears to have been published under licence of the Soviet Military Authorities.

The conciseness and also compactness of the book give the impression that it was an *ad hoc* publication for the use of medical and veterinary officers during the 1939–45 war and, as such, it would undoubtedly have been of great use.

The subject matter is probably arranged on the lines of the teaching at the Hamburg School of Tropical Medicine.

The first part of the book treats of the protozoa on general lines and calls for no special comment. The classification of the protozoa is given in a table and there is a smaller table enumerating the species parasitic in man.

The second part treats of the various divisions of the parasitic protozoa on conventional lines. The account is very complete within the severe limitations of space and the descriptions are clear and accurate as one would expect from so well-known an author.

The diagram of the life-cycle of the malaria parasite on page 64 shows a hypothetical exo-erythrocytic stage in the endothelial cells of blood capillaries, a guess now known to be incorrect.

Plasmodium falciparum is given as a synonym of *P. immaculatum*. This, even if correct, only makes for confusion now that the former name is so universally used.

The book, as a whole, falls into the class of handbook, albeit a good one, and can be recommended to anyone wishing a concise description of parasitic protozoa in German. *H. E. Shortt*

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